

FRIDAY, JUNE 15, 1883.

DARWIN.

I.

HE was a bold discoverer of the wise
And lucid order of the world, who bade
Men love the truth and speak it, and be glad
When each ideal of superstition dies.

The bigot cursed him, and, with flaming eyes,
Flashed hate upon him as on one gone mad
With stark God-enmity, although he had
No blacker sin than honest hearts devise.

He was a hero for the right of men
To seek beyond their bibles, churches, creeds,
Beyond the rigid will of pope or priest,

Thought buried deep in nature; holy when
Revealed to us by any soul that reads
The infinite mind in God and man and beast.

II.

Amid the hard endeavor of old days,
He strove supremely, and, with patient will,
Climbed masterfully onward, upward, till
He rose above men's bitter blame or praise.

He probed our life along its secret ways,
Back through historic centuries, farther still.
He traced the simple, clear designs which fill
Creation as they fill a robin's lays.

Within the vast complexity of forms,
Births of one primal ancestry he saw,
Like stars and planets from one chaos hurled,

And showed, through aeons of fire and flood and
The march of evolution and of law, [storms,
The beauty and the wonder of the world.

III.

Ah! we could only listen when he told,
How, through the antique ages to the new,
Life from a barbarous toil and struggle grew,
Like a staunch creeper from an arid mould;

How savage instinct in the strong and bold
Crushed out the weak, and how the mightier few
Roamed in their wild blood-thirstiness, and slew
The fierce-fanged slayers that had been kings of old.

He pictured to our eyes the carnal strife,
The eternal woe and pathos of the earth,
And awful brooding death which makes us mute:

And thus he spoke the story of our life,
The growth of mind from some tenebrious birth,
The soul of man developed from the brute.

No. 19. — 1383.

IV.

Since he has lived, our human thought has gained
Fresh wings and ampler airs. His courage broke
The serfdom of tradition, and awoke
New visions of a freedom unrestrained.

He was our modern prophet. Truth remained
As fruit of all the burning words he spoke;
And, seeing with his strong eyes, our dreams evoke
A future which shall be at last attained.

He shaped our way, and we shall follow. Time
And hope are with him and with us to-day;
And out of sky and sunlight and the dark

Shall come a knowledge radiant and sublime,
And song, whose music will not pass away,
Triumphant as the singing of the lark.

GEORGE EDGAR MONTGOMERY.

RECENT EXPLORATIONS IN THE RE-
GION OF THE GULF STREAM OFF
THE EASTERN COAST OF THE UNITED
STATES BY THE U. S. FISH-COMMIS-
SION.¹

3. Influence of the Gulf Stream.

THE bottom along the upper part of this slope and the outermost portion of the adjacent plateau, in 65 to 150 fathoms, and sometimes to 200 fathoms or more, is bathed by the waters of the Gulf Stream. Consequently the temperature of the bottom water along this belt is decidedly higher than it is along the shallower part of the plateau, nearer the shore, in 30 to 60 fathoms. The Gulf Stream itself is usually limited in depth to about 150 fathoms, and often even less, in this region; below this the temperature steadily decreases to the bottom of the ocean-basin, becoming about 38°-37° in 1,000 to 1,500 fathoms, and falling to 37°-35° in 1,500 to 2,500 fathoms. We may, therefore, properly call the upper part of the slope, in about 65 to 150 fathoms, the warm belt. According to our observations, the bottom temperature of the warmer part of this belt, in 65 to 125 fathoms, is usually between 47° and 53° F. in summer and early autumn. Between 150 and 200 fathoms the temperatures, though variable, are usually high enough to show more or less influence from the Gulf Stream. On the warm belt we took numerous kinds of animals that were previously known only from the Gulf of Mexico or the Straits of Florida. Some belong to tribes that have always been considered as tropical or subtropical, such as *Dolium*, *Marginella*, and *Avicula*, among the shells. In

¹ Continued from No. 16.

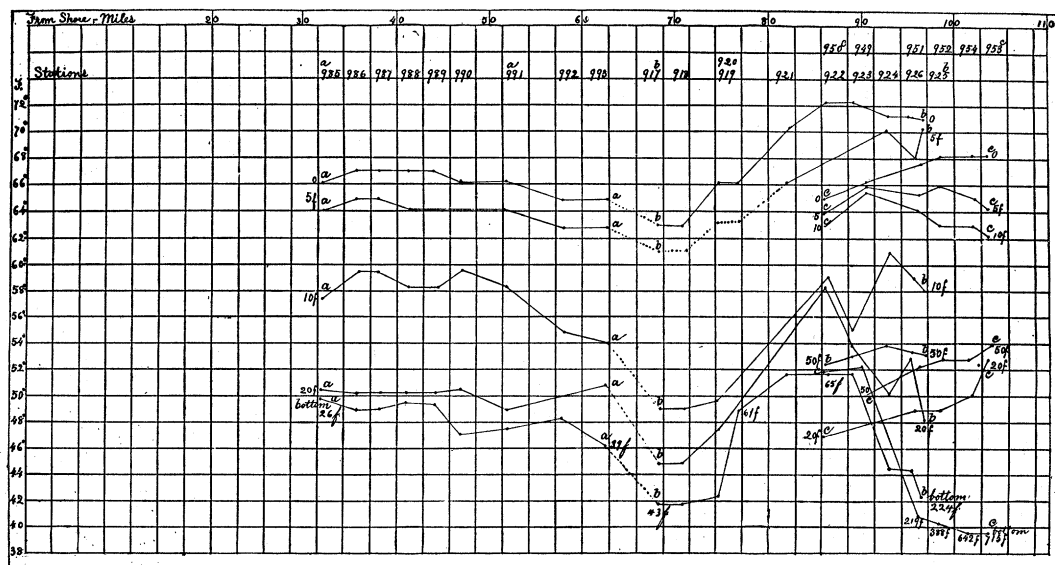


DIAGRAM 2. — Temperature curves at the surface and bottom, and at the intermediate depths of 5, 10, 20, 30, and 50 fathoms, arranged according to the distance, in miles, from the shore. The observations were made on three different days, as indicated by the letters *a-a*, *b-b*, *c-c*. The dotted lines indicate breaks in the actual series of observations.

fact, this belt is occupied by a northern continuation of the southern or West Indian Gulf Stream fauna. Our observations, both on the animal life and the temperature, demonstrate that the western edge of the Gulf Stream

is much nearer this coast than it is located on most modern charts. According to our experience, the influence of the Gulf Stream becomes decidedly marked by the rise in temperature at a few fathoms below the surface,

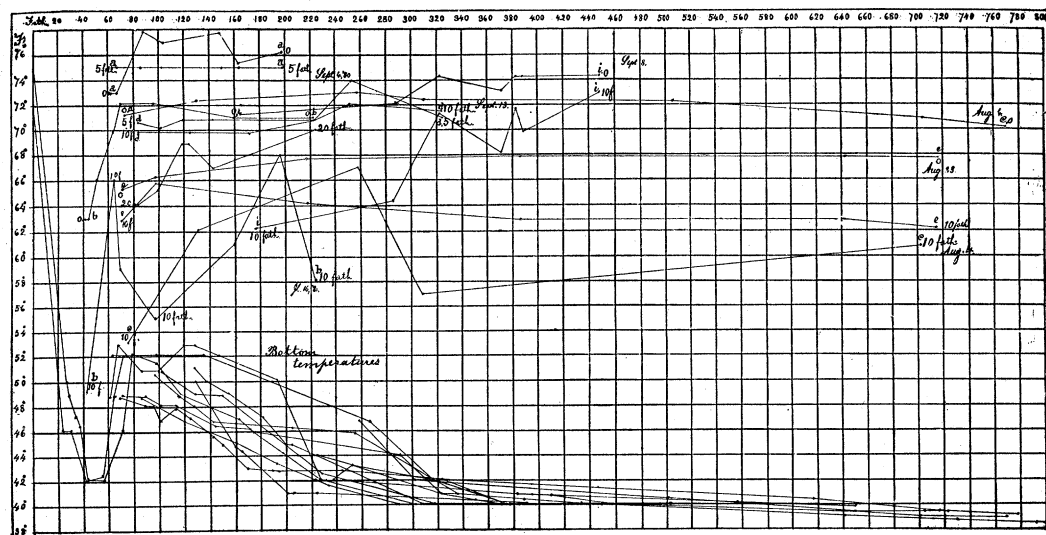


DIAGRAM 3. — Temperature curves at the bottom and surface (*o*), and at 5, 10, and 20 fathoms in the same localities. The curves of bottom temperatures extend from the shore to near the 800-fathom line on the Gulf Stream slope. The position of each station is indicated by the total depth placed at the head of the vertical columns.

and also at the bottom, along a belt corresponding nearly with the 65-fathom line in summer. This is shown both by the abundant occurrence of the various pelagic animals, gulf-weed, etc., characteristic of the Gulf Stream water farther south, and by the temperatures taken by us. The diagrams of temperature curves in 5, 10, 20, 30, and 50 fathoms, all illustrate this, as well as those of the surface and bottom. The recent English admiralty charts, and others, place the inner edge of the Gulf Stream, in summer, entirely outside the slope, or 40 to 50 miles farther from the coast than we have found it in this region. In summer, as is well known, the Gulf Stream is noticed nearer the coast than in winter; but this, doubtless, applies strictly or chiefly only to the surface water. But in summer, owing to the heat of the sun, there is often very little difference between the temperature of the *surface water* at the Gulf Stream and on the in-shore plateau. Our investigations show that the warm belt, in 65 to 125 fathoms, is inhabited by a peculiar southern fauna that could not exist there if the Gulf Stream did not flow along this area, at the bottom, both in winter and summer. It is evident that what many of these species require is *not a very high*, but a *nearly uniform temperature* all the year round. Such an equable temperature could not exist in this region, except under the direct and constant influence of the Gulf Stream. On the lower part of the slope, in 300 to 780 fathoms, we found numerous arctic forms of life, corresponding to the lower temperature, which, at 300 to 500 fathoms, is usually 41° to 40° F.; and, at 500 to 1,200 fathoms, 40° to 38° F. On the in-shore plateau, which is occupied by a branch of the cold arctic current, about 30 miles wide, we found that the temperature of the bottom water usually varied from 46° to 42° F. in August, at the depths of 30 to 60 fathoms. In some instances

it was higher than this nearer the shore, and especially opposite the mouths of the bays and sounds, where the tidal flow rapidly mingles the warm surface water (70° to 75°) with the bottom water. On the cold part of the shore-plateau we also found an abundance of arctic species of animals, such as are found at similar and less depths north of Cape Cod and in the Bay of Fundy. During the colder season of the year, the temperature of the water over this plateau is decidedly lower; for cod-fish, even, are taken here in large numbers in winter. This plateau, especially over its shallower portions, has, therefore, a *variable cold*

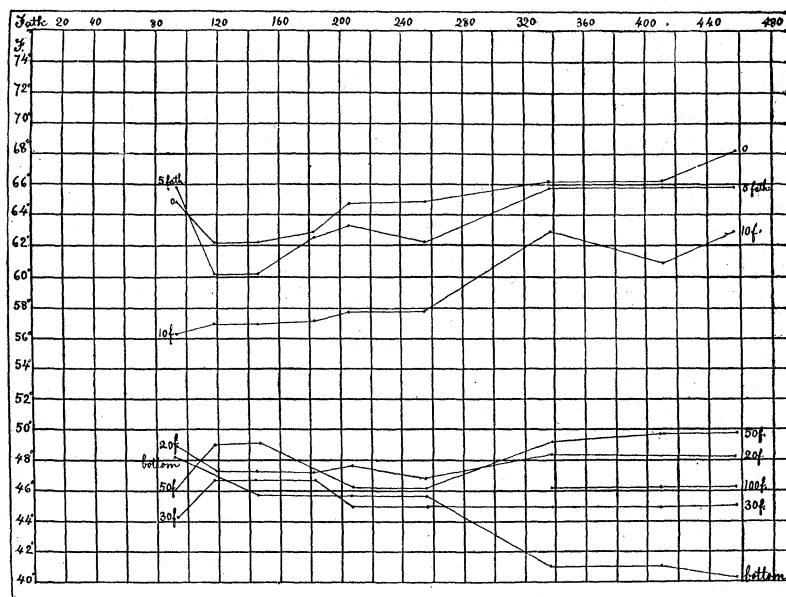


DIAGRAM 4.—Temperature curves at the bottom and surface (o), and at the intermediate depths of 5, 10, 20, 30, 50, and 100 fathoms. These observations were all made Sept. 14, 1881. This illustrates the rise in temperature between 30 and 50 fathoms from the surface.

climate. But the deep water, below 300 fathoms, has a *uniformly cold climate*. It is evident that the warm belt is here a comparatively narrow zone along the bottom, wedged in between the cold waters of the in-shore plateau and the still colder waters that cover the outer and deeper part of the Gulf Stream slope. The actual breadth of this warm belt varies, however, according to the steepness of the slope, and in consequence of variations in the currents. Just south of Martha's Vineyard, as will be seen by map I, the slope appears to be less rapid than it is either to the eastward or southward, and consequently there is here a broader area occupied by the warm belt,

especially between the 65 and 150 fathom lines. Probably this warm belt finally narrows out and disappears from the bottom before reaching the coast of Nova Scotia. We have hitherto obtained no evidence of such a belt off that coast from temperature observations and the character of the fauna; therefore it is probable that the cold water of the greater depths there mingles directly with that of the in-shore plateau. Southward, the warm belt continues to the Straits of Florida, and beyond, the depth of the water characterized by identical temperatures gradually increasing as we go south. At Cape Hatteras this belt becomes very narrow, owing to the abruptness of the slope, and approaches much nearer to the shore; but off the Carolina coasts it spreads out over a wide area, which is inhabited by a rich fauna, similar to that investigated by us off Martha's Vineyard. Many of the species are already known to be identical.

In the following summary table are shown the usual range of variation, and the approximate average temperature at the bottom, in the more characteristic zones of depth, beyond 20 fathoms, in summer:—

Bottom temperatures.

Fathoms.	Usual range.	Approximate average.
20 to 25	45°-51° Fah.	49° Fah.
25 to 58	42°-46° "	44° "
65 to 130	47°-53° "	50° "
65 to 150	46°-53° "	49.5° "
65 to 190	43°-53° "	48.5° "
150 to 200	43°-50° "	47° "
200 to 300	41°-46° "	43° "
300 to 450	40°-42° "	40.5° "
450 to 600	40°-41° "	40° "
600 to 800	39°-40.5° "	39.5° "
800 to 1,400	38°-39° "	38.5° "

[From this table, and from the diagrams (2 and 3), a few of the published temperature observations, which were abnormally high, have been excluded, because they were probably erroneous, owing to a displacement of the index, or some other accident.]

A singular feature of the serial temperatures taken at many stations is illustrated by diagrams 3 and 4. In twenty-nine localities out of thirty-six, where sufficiently full series of temperatures were taken, the temperature was lower at 20 to 30 fathoms than at 50 fathoms. Usually the temperature falls pretty regularly from 5 to 30 fathoms; it then rises often three or four degrees, and sometimes eight

to ten degrees, at 50 fathoms, falling again at 100 fathoms; but the temperature at 100 fathoms was often higher than at 30 fathoms. In some cases, as shown in diagram 4, the temperature was lower (45° F.) at 30 fathoms than even at the bottom in 200 to 250 fathoms. There is often, therefore, a stratum of colder water, 20 to 40 fathoms beneath the surface, overlying the warmer Gulf Stream water, situated between 50 and 100 fathoms, below the surface in this region. This stratum of cold water may be a lateral extension of the cold water of the in-shore plateau, situated at similar depths. Perhaps the greater density of the Gulf Stream water, due to evaporation, may so nearly balance the increase in density due to lower temperature as to make this a phenomenon of constant occurrence at these depths.

It happened not infrequently that the surface temperature, early in the morning, when we usually began dredging, was one or two degrees lower than that at 5 fathoms, but, during the middle of the day, the surface water was generally slightly warmer than that at 5 fathoms. These changes are illustrated by some of the lines on diagrams 3 and 4.

[To be continued.]

TRANSFERRED IMPRESSIONS AND VISUAL EXALTATION.

THERE has recently appeared in the *Fortnightly review* an article by Messrs. Edmund Gurney and F. W. M. Myers, regarding the subject of what is popularly known as *clairvoyance*. By these authors it is termed 'transferred impression.' The gentlemen in question, working under the auspices of the Society for physical research, have, as they claim, collected an enormous amount of evidence, all tending to prove that the mind can, under certain conditions, receive impressions through other agencies than the senses. The mental conditions under which this power is developed are generally abnormal, either as regards the Percipient or the person perceived, who is called the Agent. The cases are classified in accordance with this condition. I append here a specimen of the stories which these gentlemen attest as true.

"A mesmerist, well known to us, was requested by a lady to mesmerize her, in order to enable her to visit in spirit certain places of which he himself had no knowledge. He failed to produce this effect, but found that he could lead her to describe places unknown to her, but familiar to him. Thus, on one

occasion he enabled her to describe a particular room, which she had never entered, but which she described in perfect conformity with his recollection of it. It then occurred to him to imagine a large open umbrella as lying on a table in this room, whereupon the lady immediately exclaimed, 'I see a large open umbrella on the table.' "

Now, the facts which these gentlemen are trying to establish are entirely antagonistic to modern physiological views, as I have written elsewhere (*New-York medical record*). It is now believed that the senses were developed in order to enable the animal to adjust itself better to its environment. They were evolved primarily *by* the environment rather than *for* it. And in the history of animal evolution there are absolutely no data to enable us to account for the existence of superior extra-sensory perceptive powers. If such powers do exist, we must seriously alter our views of evolution as regards physiological functions. Their existence is therefore antecedently most improbable, and the evidence for the same demands the most rigid scrutiny. So far, it by no means carries conviction. Messrs. Gurney and Myers give us specimen stories which are, for a large part, told by women, or even by children. Some of them are legendary, the incidents dating back a century. The authors, perhaps, allow for unconscious exaggeration, but it does not appear so. They certainly do not, in their estimate, allow for the element of coincidence. Thousands of 'impressions, dreams,' etc., occur daily: we only hear of those which appear to be true.

Finally, and it is this point which I especially wish to bring out, the London quasi-scientists do not appear to be aware that there is most likely such a thing as an enormous exaltation of the sense of vision. This possibility ought certainly to be taken into account in studying the class of phenomena under consideration.

As evidence of this power of visual exaltation, I beg to relate the following experiment:—

In the summer of 1881, the late Dr. George M. Beard, Dr. William J. Morton, editor of the *Journal of nervous and mental diseases*, of this city, and myself, called by appointment upon a Mr. Carpenter, who was a professional mesmerizer, then stopping in this city. Our object was to test the alleged power of Mrs. Carpenter, his wife, to read and see objects when blind-folded. Mr. Carpenter was a man of much intelligence, and, I believe, honest,

though necessarily using a little humbug to give more effect to his dramatic performances. He knew perfectly well that mesmerism was merely a morbid psychological condition, not involving any occult force. His wife was a lady of about thirty years of age, of very pleasing appearance, intelligent, refined in manner, and evidently of a highly sensitive organization. She was easily susceptible to her husband's influence, and could be hypnotized by him. In the hypnotic condition, at certain times, her visual sense appeared to be enormously exalted. Dr. Beard had, on several occasions, under suitable tests, seen her read cards with eyes closed and bandaged. Sometimes, however, she had failed.

On the present occasion we were ushered into the large back-room of a New-York boarding-house, Mrs. Carpenter and her husband being the only persons present besides ourselves. It was broad daylight, and there was no attempt to darken the room. Mr. Carpenter hypnotized his wife so that, while perfectly conscious of every thing, she could not open her eyes. Her eyes were then bandaged with four handkerchiefs. Two were folded, and laid as pads over each eye; the others were tied around the head. In addition, a strap was tied around just below the nose. (I have bandaged my own eyes in this fashion, and found that I could not distinguish light from darkness.) Mrs. Carpenter was placed in a chair at one end of the room. Mr. Carpenter's eyes were then bandaged, and he was placed at the other end of the room, so as to prevent any possible collusion. A pack of cards which had been brought by Dr. Beard was shuffled, and placed, with faces down, upon a table beside Mrs. C. One of us then took a card, and handed it to her. She held it in one or both hands before her eyes, sometimes pressing it upon her forehead. No questions were asked by any one. Her husband remained silent. She would first tell the color (red or black), then the kind (diamonds, spades, etc.), then the number of spots. Sometimes she did it quickly, sometimes slowly: occasionally she failed. Sometimes she could only tell the denomination, and could not count the spots. Dr. Morton had brought in his pocket a private dinner-card with 'B. No. 9' printed upon it. No one but himself had ever seen it in his possession before. Mrs. C. took this in her hand, and read it. The picture-cards were sometimes distinguished also. The letters and figures looked, she said, much magnified. It generally required several seconds

for the impression to be created. In some cases, after she had held the card for some time and failed to read it, she laid it down, took up another, and called it by the name of the card laid down, showing that the impression from it had just been received. Any entirely opaque object placed between her eyes and the card prevented her reading it. She could not see objects to one side of the range of her eyes; e.g., behind her head.

All the phenomena seemed to point to the theory that she had an extraordinary exaltation of vision rather than any extra-sensual power, and I am at present inclined to adopt this explanation.

I have not been able to repeat this experiment. Mr. Carpenter refused to allow his wife to repeat it, as it injured her health. My friend, Dr. E. S. Bates of this city, has a lady acquaintance who has, he says, the same power. Dr. Beard told me a year ago that similar experiments had been tried by some friends of his in Boston.

I believe that the above experiment was the first successful one in which this power of *clairvoyance* was so carefully tested in broad daylight, with every possible source of error excluded. We were none of us able to see how any trick could have been played; nor was there any object for trickery, as no money was paid, and the experiment was only allowed as a special favor.

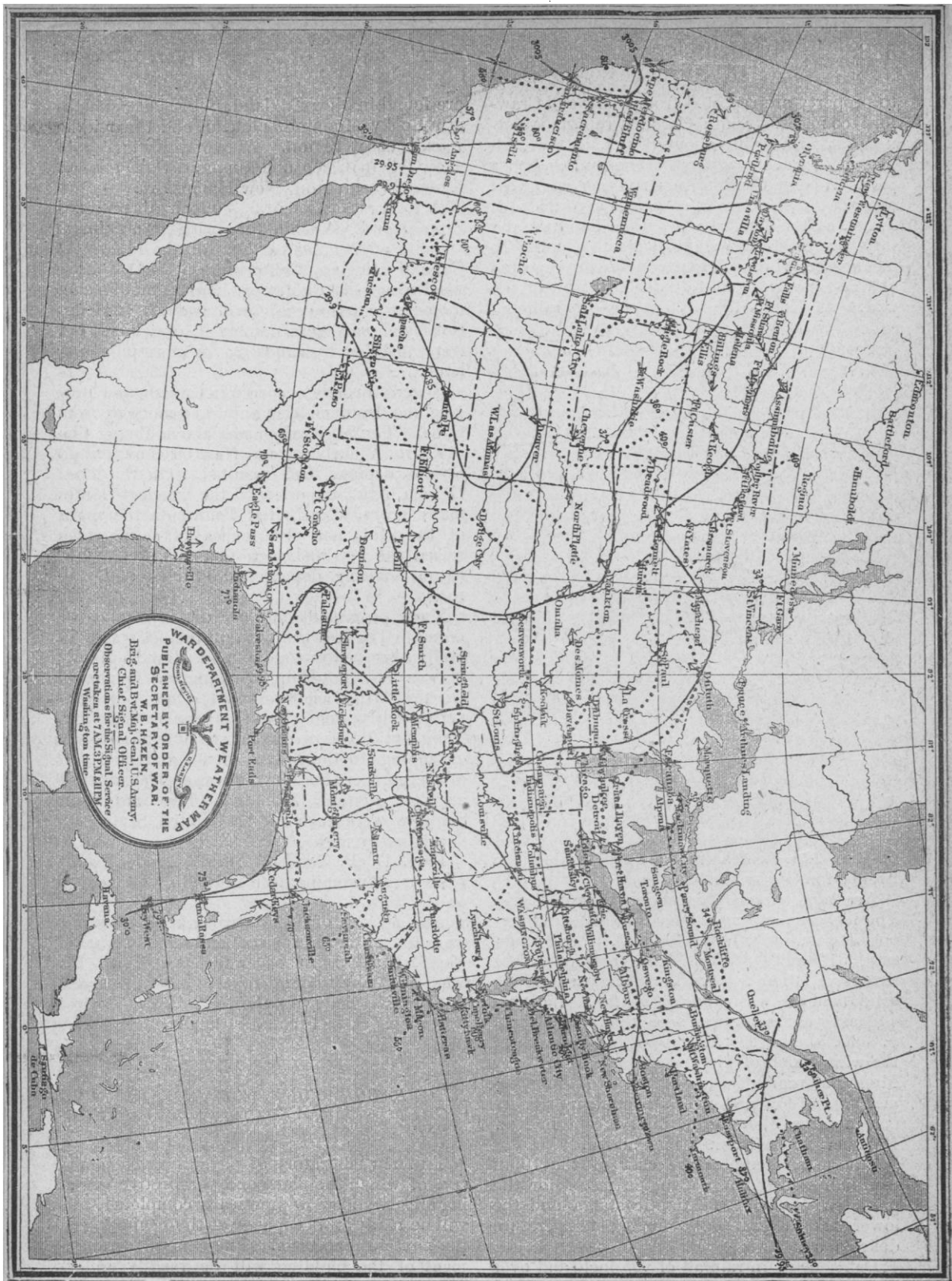
I venture, therefore, to submit the account which is here written out in full for the first time. It is quite possible that this power of exaltation of vision may explain many cases of so-called 'transferred impression;' at any rate, experimenters like Messrs. Gurney and Myers should be aware of its probable existence.

C. L. DANA, M.D.

THE WEATHER IN APRIL, 1883.

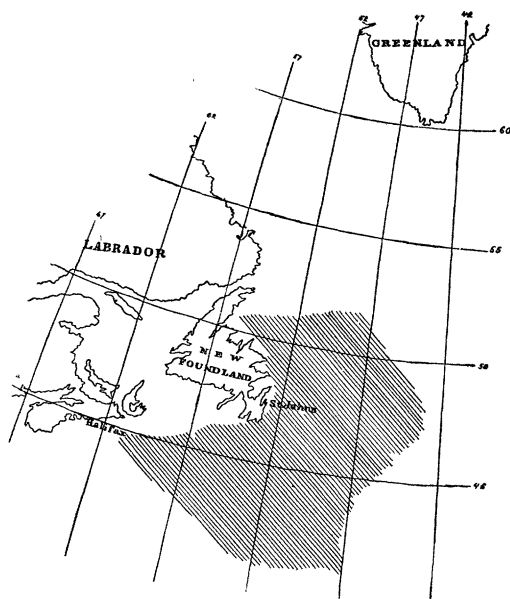
THE most marked storm of the month appeared on the North Pacific coast on the 18th. Crossing the Rocky Mountains, it was central in Colorado on the 21st, and passed off the Atlantic coast on the 23d. On the 21st, pressures below twenty-nine inches (lower than before noted in this region in twelve years) were recorded in and near Colorado. Attending this depression were exceedingly severe local storms and tornadoes, which form the main feature of the weather this month. These were specially severe in Iowa, Alabama, Mississippi, and Georgia. In the latter two states, from two hundred to three hundred people lost their lives. In Colorado a passenger-train was

thrown from the track near Como on the 21st; at Pueblo the storm began at 2 P.M. of the same date, and was the worst ever known there: several houses were unroofed. Kansas reports a tornado at Kingman on the night of the 20th: it struck Lun City at 2 A.M. of the 21st, destroying five houses, and killing two people; hailstones nine inches in circumference fell in Harper county; at New Bedford three houses were blown down, and one person was killed. Iowa was visited by tornadoes during the nights of the 21st and 22d: these destroyed farmhouses, and some lives were lost. Mississippi reports a tornado at 1.10 P.M. of the 22d, near Starkville: its width was three hundred yards, and within it every thing was levelled to the ground; one life was lost. The most terrible disaster from this cause occurred in Wesson and Beauregard, about a hundred and forty miles south-south-west of Starkville. Wesson, a town of seventeen hundred inhabitants, was struck at 3.15 P.M. of the 22d. Twenty-seven houses were destroyed, sixty people injured, and thirteen were killed. At Beauregard, with six hundred inhabitants, the tornado, lasting fifteen minutes, destroyed every dwelling and store, seriously injured forty, and killed twenty-nine people. Clay county was visited by two tornadoes,—one at noon, and the other at 1 P.M. of the 22d; both were violent, causing loss of life and property. In Monroe and neighboring counties to the north, a number of persons were killed. In Jefferson county the tornado is reported at 11 A.M. of the 22d: it was two hundred yards wide, and swept every thing before it. There was some loss of life. Ten people were killed at Harrisville, seven near Morton, and two at Calcedonia. The storm passed east of Natchez at about 10.30 A.M., and east of Monticello (nearly destroyed by the tornado of April 21, 1882) at 11 A.M., 22d. The track was about two hundred yards wide. There was some loss of life. In Alabama, at Talledega, a train was blown from the track. In Georgia the storm, accompanied by hail, began at Americus between 3 and 4 P.M., 22d. As far as known, the track was narrow. Buildings were blown down, and some persons killed. The next morning, between 6 and 7, a tornado passed through Emanuel county, about a hundred and twenty miles east-north-east from Americus: all houses in its track were swept away, two persons killed, and several injured. A like storm-wind was felt in Dodge county about the same time. In Dougherty county the track was about a quarter of a mile wide. Eight persons were killed, and twenty injured. Loss of life and great damage



MONTHLY MEAN ISOBARS, ISOTHERMS, AND WIND-DIRECTIONS, APRIL, 1883. REPRINTED IN REDUCED FORM
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to property are reported from Clark and Crawford counties. South Carolina reports a tornado at Bishopville about 8 A.M. of the 23d. The main track was about a hundred and fifty yards wide, and within it every thing was swept away. North Carolina reports a tornado at 7 A.M. of the 23d, with a path a hundred and fifty yards wide and about four miles long. In Tennessee, winds of great violence are reported at Chattanooga from 4.40 to 5.10 P.M. of the 22d. At Knoxville, 3.75 inches of rain fell



on the 22d, which is the greatest fall in twenty-four hours for five years.

Accompanying is the iceberg chart for April. The icebergs appear to have been most numerous between latitude 41.5° and 43.5°, and longitude 51° and 49° W. This region is less extensive than in April, 1882; and, while solid field-ice was reported as far as latitude 44° last year, none was seen this. The map, p. 537, shows, that, as usual in this month, the winter area of high pressure in the Rocky Mountain region is giving way to the summer area of low pressure. The mean pressure is generally below the normal, except in New England, where it is .07 inch above.

The mean temperature east of the 100th meridian was 1.95° above the mean for the past ten Aprils, the Atlantic states and the lower lake region only, having temperature deficiencies.

Deficiencies in rainfall of .05 inch and over

are found in New England, upper lakes, northern Rocky Mountain plateau, and the middle Pacific coast region. Above thirty inches of snow fell in Cisco and Summit, Cal., and on Mount Washington, New Hampshire.

A total air motion of 23,900 miles is reported from Mount Washington, with a maximum velocity of 88 miles per hour on the 11th. At Cape Mendocino, California, on the 15th, the wind rose to 120 miles per hour, when the anemometer cups were blown away. 124 cautionary signals were displayed, of which 91% were justified by winds 25 or more miles per hour.

Severe freshets occurred in Canada and New England from melting snows as much as from rains. The Mississippi was above danger-line at Cairo, Vicksburg, and New Orleans, but no serious damage had resulted. On the 21st, Helena, Ark., experienced the heaviest rain in many years. Nashville, Tenn., on the night of the 21st, had five inches of rain, which raised the river sixteen feet in twenty-four hours, causing damage to bridges and railroads.

Two prominent auroral displays may be noted. The less brilliant, on the 3d, was generally observed in Canada and New England; it was also noted in Washington Territory. On the 24th was observed the more brilliant and extensive one. This was seen at Nashville, Tenn., at 7.50 A.M., as an arc of whitish light extending to the height of 9° and over 40° of the northern horizon: it was seen as far west as Fort Benton, Montana. Less important displays were seen in the United States on nearly every night.

Prof. D. P. Todd of Amherst reports sunspots most prominent on the 15th, and least so on the 30th.

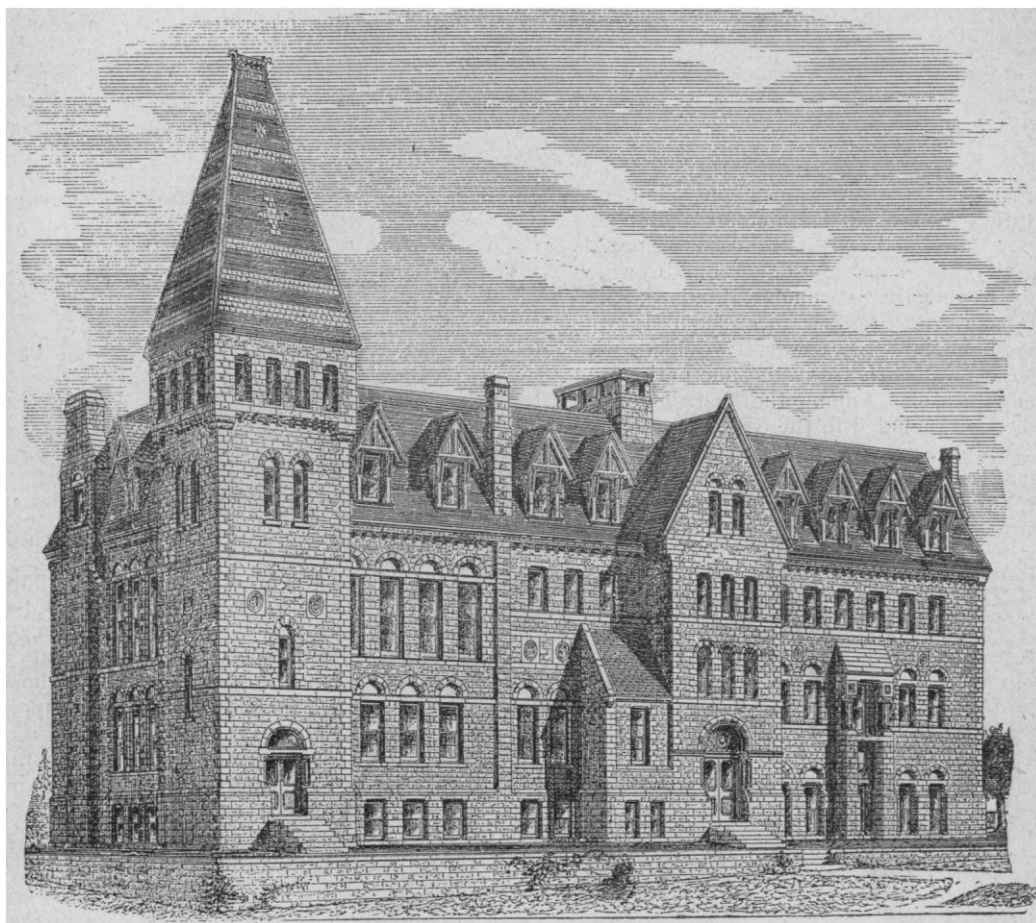
At 8.50 A.M. of the 2d, two light earthquakes were felt in San Francisco, and at 2.36 A.M. of the 12th a heavy shock was felt at Cairo, Ill. *The New York herald* reports a severe shock in Catania, Sicily, on the 3d, and *Nature* reports a shock in Finland at 9 A.M. of the 8th.

NEW LABORATORY FOR PHYSICS AND CHEMISTRY AT CORNELL UNIVERSITY.

THE new laboratory of physics and chemistry, of which the plans and perspective drawing are given, is now practically completed, and will be ready for occupancy at the beginning of the next autumn term. The general arrangement of the building will be readily under-

stood from the plans. The basement contains the laboratory of assaying, the large physical laboratory, and a number of rooms devoted to special purposes in the department of physics, three of which have floors of cement, affording at any point sufficiently firm foundation for galvanometers. Certain other rooms are pro-

Power from a large turbine, situated in the gorge north of the building, serves for driving dynamos, ventilating machinery, and air-pumps for vacuum and blast, as well as for the purposes of the workshop. The latter is fully equipped with tools and machinery, and is in the charge of a skilful mechanic from



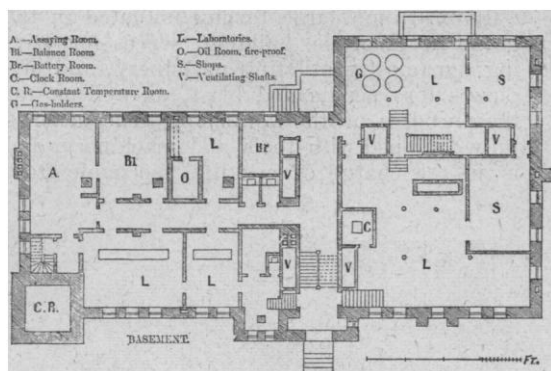
NEW LABORATORY FOR PHYSICS AND CHEMISTRY, CORNELL UNIVERSITY.

vided with solid masonry piers for apparatus requiring immovable support.

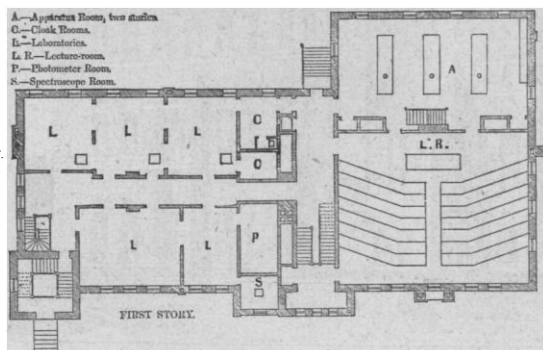
The large physical lecture-room, with its adjoining apparatus-rooms, occupies one-half of the first floor. The remainder consists of laboratories and work-rooms designed for various purposes of instruction in physics, several of which are also provided with masonry piers. One room (without windows) is for photometric work.

Göttingen, who devotes his whole time to the manufacture of apparatus.

All the principal rooms of the building are supplied with water, steam, house-gas, oxygen, hydrogen, vacuum, and blast. The oxygen and hydrogen are generated by electricity from the dynamos, and stored in large gasometers, the apparatus employed producing hydrogen at the rate of three cubic feet per hour. In all the rooms where time observations are to



be made, there are clocks controlled, according to Jones's method, by a standard clock provided with Professor Young's gravity escapement. The room in which this beautiful instrument stands is, like the constant temperature room in the basement of the tower, provided with double walls to prevent fluctuations of temperature. Among the instruments of precision included in the equipment of the laboratory, may be mentioned two cathetometers, a standard metre and yard by Professor Rogers of Cambridge, one comparator, two fine chronographs, three spe-

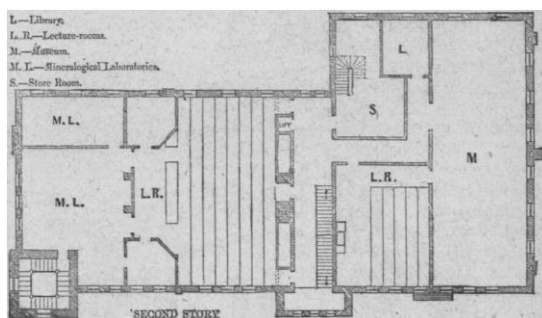


rometers, a spectrometer with twelve-inch circle reading to single seconds, two magnetometers, several galvanometers of high and low resistance, sets of resistance coils, and different forms of calorimetric apparatus.

Students entering the laboratory begin with simple illustrative experiments, and, as they acquire skill in manipulation, are assigned experiments requiring the use of instruments of precision. Some of the more advanced are now making determi-

nations involving measurements of the greatest accuracy.

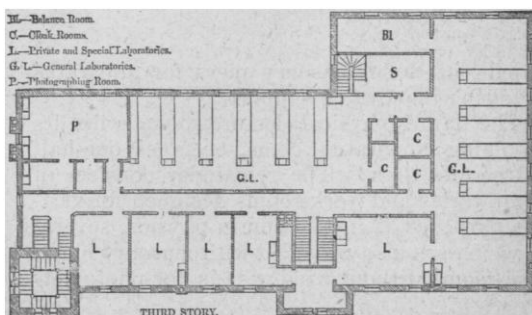
On the second floor are the mineralogical laboratory, furnished with blowpipe tables covered with white Minton tiles, the large chemical lecture-room, the museum for the collections of mineralogy and industrial chemistry, storerooms, and private laboratories. The third floor consists of the laboratories for qualitative and quantitative analysis, the photographic laboratory, rooms for special work in organic chemistry and gas analysis, balance-room, reading-room, and storerooms.



The equipment of the building will be complete in every particular; and no pains have been spared to secure the most perfect apparatus to be obtained at home or abroad. Many important improvements in the fixtures and arrangement of the laboratories, work-tables, gas and water supply, have been introduced.

The two departments have been rapidly outgrowing their accommodations during the past few years, and the increased laboratory space the new building will afford will effect a marked increase in the amount of special and original work.

SPENCER B. NEWBURY.



ST. DAVID'S ROCKS AND UNIVERSAL LAW.

A DISCUSSION of the St. David's rocks has been opened in the Geological society of London by Prof. A. Geikie, director of the Geological survey of Great Britain and Ireland, which possesses great interest to all persons engaged in the study of the older crystalline rocks. The St. David's rocks, according to Dr. Hicks, consist of three distinct pre-Cambrian formations in ascending order: the Dimetian, composed of crystalline, gneissic, and granitoid rocks; the supposed unconformable Arvonian, formed of felsites, quartz porphyries, h  lleflintas, etc.; and the Pebidian, supposed to be unconformable to both the preceding, and made up of tufas, volcanic breccias, and basic lavas. The Cambrian is said to overlie all these, and to have a basement conglomerate composed of their ruins.

Dr. Geikie maintains that the Dimetian is an eruptive granite, which has disrupted and altered the Cambrian strata, even above the horizon of the supposed basal conglomerate. Besides a pebbly quartzite formed of fragments torn from the Cambrian conglomerate and greatly indurated, no rock, except diabase, is found, according to him, in the granite area; and this occurs throughout the entire district. The granite cuts through successive horizons of the Cambrian strata, and is younger than all of that formation in the district. The Arvonian consists of quartziferous porphyries, or elvans (associated with the granite), and of the metamorphosed strata adjacent. The Pebidian consists of a series of volcanic tufas and breccias, with interstratified and intrusive lavas.

Geikie holds that the Pebidian is an integral part of the Cambrian. It is cut by the Arvonian porphyry and Dimetian granite, and is therefore older than these. It is covered quite conformably by the Cambrian conglomerate, and not unconformably, as Hicks claimed. Seams of tufa are interstratified at various horizons in the conglomerate and strata above. This Cambrian conglomerate, instead of being composed of fragments of the Dimetian, Arvonian, and Pebidian, consists almost entirely of quartz and quartzite; "only four per cent of fragments having been found to have been derived from some of the projecting lava-islands underneath it." Professor Geikie then claims that the names Dimetian, Arvonian, and Pebidian "had been founded on an error of observation, and they ought to be dropped out of geological literature."

Prof. A. Renard also states that he had examined these rocks microscopically, in concert with Drs. Zirkel of Leipzig, and Wichmann of Utrecht; and their conclusions are, that the so-called Dimetian rock is unquestionably a true granite (eruptive). The quartz porphyries were like the contact specimens of granite, and believed to be such. The tufa found in and above the conglomerate is a true tufa, and not a mere superficial waste of older volcanic rocks. The observed foliation existed above the conglomerate as well as below.

That the questions involved in Dr. Geikie's position are deeply interesting, is manifest from the fact that some fourteen persons joined in the discussions which followed its statement. These questions are of equal interest to American geologists and petrographers, since they are the same as those the present writer has raised regarding eastern Massachusetts, — a district similar to St. David's, — also similar to those raised by Professor Dana against the Taconian, Montalban, and Huronian, in New England; by Dr.

Selwyn, concerning the Norian, Montalban, and Taconian, in Canada; by Messrs. Whitney, Selwyn, Winchell, and Wadsworth, with respect to the Lake Superior geology; and by Geikie and Wadsworth, regarding the Fortieth parallel exploration.

The writer has nowhere seen any general statement of the bearings of these questions; and it may be briefly indicated here what some of them seem to him to be. They seem to be involved in the distinction between one universal law, moving in a uniform, definite direction, and recurrent phenomena or special creations and conditions. Under the latter view there seems to belong the belief that detrital or chemical sediments are returned to eruptive forms; that eruptive rocks are of chemical or sedimentary origin; that these were different in pre-tertiary time from what they were in the tertiary; that certain geological periods are marked by certain kinds of rock; that the azoic system has been subdivided upon natural principles; that there have been recurrent periods of heat and cold. This view includes the theory of the metamorphic origin of granite, the present geologico-mineralogical classification of rocks, and embraces uniformitarianism, catastrophism, plutonism, and neptunism.

The other maintains the existence of a universal law, which should be the guide in all investigations, — a law, which, in its more special applications, Professor Whitney has endeavored to illustrate in his Climatic changes, and Sir William Thomson in his papers on the age of the earth and sun, — a law which the present writer has tried to express in his petrographical work. It is regarded as the law which will one day be completely worked out, and in accordance with which our views in history, philosophy, science, — all branches of human knowledge, — will then be reconstructed. The expression of the law varies in different ages, but for the physical universe it seems best formulated at the present time by Sir William Thomson: The degradation and dissipation of energy, the passage from the unstable towards a more stable condition, the tendency to harmonize with the environment, — the law under which the universe has moved from the beginning, and under which it will continue its course uniformly towards the end; it assumes that no turning-back can occur, and that no energy once lost can be restored, except by the same Almighty Power which gave it birth.

M. E. WADSWORTH.

THE HUMAN REMAINS OF THE BONE-CAVERNS OF BRAZIL.

THE discovery by the late Dr. Lund of human remains associated with the extinct mammalian fauna of the caverns of Lagoa Santa in the province of Minas Geraes, Brazil, made famous by his researches, has, until recently, passed almost unnoticed among ethnologists. Dr. Lund's statements in the communications which accompanied the human bones, sent to the societies of Rio de Janeiro and Copenhagen, are, I believe (I write without the documents for reference), unqualified as to the direct association of the human with the extinct mammalian remains, and have been received as conclusive by prominent ethnologists. There can be no question of Dr. Lund's perfect good faith in the matter; but it may be asked whether, forty years ago, such care as is now considered necessary in such investigations would have been exercised, even by so able and conscientious an observer as Lund is recognized to have been.

So long a time has elapsed, that it is now difficult to verify the exact conditions under which the bones

were found. In a recent flying trip through the Lagoa Santa region, I made inquiries in regard to the matter, but failed to obtain any very definite information. According to the reports of the common people, many caverns were explored by Lund and his assistants in person for the express purpose of collecting fossils, while others were worked by the people of the vicinity for saltpetre, who, under instructions from Lund, and probably as far as possible under his supervision, saved the fossils disinterred in their operations. I could learn nothing as to the conditions under which the human skull now in the museum at Rio de Janeiro, and stated to have been found with remains of extinct mammals, was met with. More definite, and apparently reliable information was given in regard to a complete human skeleton which was one of a lot sent to Copenhagen. A workman in one of the saltpetre caves at some distance from Lagoa Santa found the skeleton in his work, and, to gain the reward offered, took it to Lund, who gave him the sum of forty milreis (about twenty dollars). This man is still alive; but, from lack of time, I was unable to see him. It is said, that, on his recent visit to Minas, the emperor had an interview with him on the subject.

Recently, when in New York, I had the good fortune to meet Mr. Nicholas Brandt, son of the late Prof. P. A. Brandt, who was for many years the secretary and companion of Dr. Lund. Mr. Brandt, who had spent some time at Lagoa Santa in company with his father and Dr. Lund, kindly gave me the following note: "The remains of the prehistoric man, discovered by Dr. Lund in Minas before I came to Brazil, and about which the professor sent his memoirs to the *Instituto historico e geografico* of Rio de Janeiro in January, 1842, and April, 1844, were often the subjects of our conversation. The doctor's opinion was positive that the skeletons belonged to the same period as the fossil fauna with which he enriched the knowledge of natural history to such a large extent. The opinion of Cuvier and Humboldt, Dr. Lund's friends, was fully justified in urging the doctor to go to Brazil, and use his energies in the service of this branch of science. The doctor was, of course, a pure follower of his friend Cuvier. Darwin and Darwinism were at that time hardly heard of, as his *Blik paa Brasiliens Dyreverden* fully shows." Mr. Brandt adds, that but for the loss of all his private papers, including his Brazilian journal, and many letters from his father and Dr. Lund, in the Atlantic disaster some years ago, he would have been able to give a much more definite and detailed account of Lund's life and work at Lagoa Santa.

ORVILLE A. DERBY.

LETTERS TO THE EDITOR.

Solar constant.

THIS term is becoming prominent, and its use has given rise to some confusion. I find some authorities, taking the value given by Forbes, give 28.2 calories, while others give 2.82 calories. Since a calorie is the definite amount of heat required to raise a kilogram of water 1° C., it is evident that one of these is in error.

Professor Young, in his 'Sun,' p. 263, defines the solar constant as the amount of heat received per minute by one square metre exposed perpendicularly to the sun's rays at the upper surface of the atmosphere. No mention is made of the substance receiving the heat. In correspondence with Professor Young, I have received the following equation: the solar con-

stant = $\frac{w}{s} \times \frac{t}{m}$, in which w = mass of water, s = surface, t = quantity of heat, m = unit of time. On this basis we may define the solar constant as the amount of heat received in a unit of time, by a unit of mass, spread upon a unit of surface, exposed as above. In this equation, however, we may divide w by s , and obtain d = depth, and we shall have the

solar constant = $\frac{d \times t}{m}$; i.e., the solar constant equals the quantity of heat received from the sun at the limit of the earth's atmosphere, by a unit of depth of water, in a unit of time.

We may express this numerically as follows: take a square metre and spread upon it a kilogram of water; it will lie 1 mm. deep. Since the kilogram is the unit used in defining the calorie, we may say, using Forbes's value, that the solar constant, 28.2 calories, is the amount of heat received by 1 mm. depth of water exposed as above. The use of the term 'calorie' seems unfortunate; and we might adopt, as more satisfactory, a centimetre as the unit of depth, and degrees as expressing heat. We would then have the solar constant equal to 2.82 Centigrade-centimetre-minute degrees, or 2.82 ccm°.; i.e., the sun's heat falling upon a centimetre depth of water would raise it 2.82° C. in one minute.

This will be recognized as of the same form of expression as adopted by Herschel, who describes the sun's heat as sufficient to melt a coating of ice an inch thick in 2 h. 13 m. nearly.

H. A. HAZEN.

Spanish folk-lore.

In the account of folk-lore in Europe, in SCIENCE for May 25, I see no notice of Spanish efforts in that field. My acquaintance with the subject is but slight, yet it has extended to the important and interesting works of Antonio de Trueba, who, in 1873, spoke of himself as "almost the only writer of our country who has given himself with any diligence to this task (the collection of popular stories), especially now that the illustrious Fernan Caballero rests from his most glorious labors." The method of Trueba differs from that of the brothers Grimm, for example, in that he adds the polish of his admirable style to the rough form of the stories as they fall from the mouth of the people; such a process being necessary, he maintains, in order to fit them for a place among the products of the literary art. I subjoin a list of his publications in this department: *Cuentos de color de rosa*, *Cuentos campesinos*, *Cuentos populares*, *Cuentos de vivos y muertos*, *Cuentos de varios colores*, and *Narraciones populares*.

ROLLO OGDEN.

Cleveland, O., May 25.

Capture of the crested seal on the coast of Massachusetts.

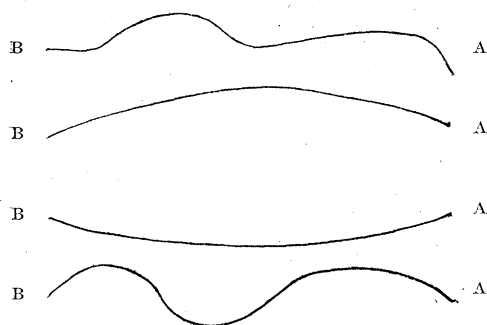
At various times large seals have been seen or taken on the coast of Massachusetts, and, although in no case positively identified, presumed to be examples of the crested seal (*Cystophora cristata*), mainly because a specimen of this species, described long since by Dr. DeKay, was taken in 1824 in a small creek emptying into Long Island Sound at East Chester, about fifteen miles from New-York City. As two other large seals — the gray seal (*Halichoerus grypus*) and the bearded seal (*Erignathus barbatus*) — are almost as likely to occur on the New-England coast as this one, it is some satisfaction to be able to record the capture of a well-identified example of the crested seal in Newburyport harbor, May 2, 1882. Mr. E. C. Greenwood of Ipswich, by whom the specimen was secured and mounted, informs me that

it was a fine adult male, eight feet in length, weighing very nearly one thousand pounds. The specimen was purchased by Dr. G. E. Manigault for the museum at Charleston, S.C., where it is now preserved.

That this species is prone to wander far from its usual haunts—the icefields eastward of Newfoundland and northward—is attested by its capture, not only near New-York City, but also at Cambridge, Md., in an arm of Chesapeake Bay, as recorded some twenty years ago by Professor Cope. The present record, however, is the first of the capture of a positively identified example of any seal on the New-England coast other than the common small harbor seal (*Phoca vitulina*). J. A. ALLEN.

Flight of the flying-fish.

On a recent trip from New York to Galveston, with the weather at the start cold and chilly, wind north-east, and ending in the Gulf with clear sunny days and summer breezes, there was every opportunity afforded for watching the flight of flying-fish. The first fish were seen two days out of New York; and on every day thereafter, save on one when off the coast of Florida, numerous brown pelicans were observed. Probably the flying-fish found the atmosphere a trifle heavy, flitting about with pelicans for interested spectators, and attended strictly to their domestic duties. The act of flying is somewhat startling, the fish emerging with much energy, and, from the very start, buzzing its wings like a humming-bird; and in no instance did the buzzing cease until the fish disappeared in the sea at the end of its flight. The longest flight observed continued, without any contact with the water, for nine seconds; estimated distance, six hundred to eight hundred feet. In some cases the flight was nearly horizontal; in most cases, however, it was arched vertically. Flying across the wind, it was noticed that contact with the water did not apparently retard the movement of the fish in the air. Some of them made four contacts before finishing the flight. The wind had some effect upon the direction and character of the flying; but fish were noticed going with the wind, and crossing it in every direction, and a few flying directly



against it; A being the starting-points; B, the end, and the line of flight being shown as it appeared from a point in a vertical plane connecting A and B.

GEORGE J. CARNEY.

Lowell, Mass.

Sun's radiation and geologic climate.

It seems to me that Mr. Warring, in his objection (SCIENCE, p. 395) to the assumption that the dissipation of solar energy from loss of heat diminishes the supply of sun-heat received by the earth, has

overlooked the very important factor of the variable area of the contracting sun. To make this clear, let

Q = Quantity of heat incident normally on a unit surface in a unit of time, at the earth's distance from the sun.

R = Radiating or heat-emitting power of each physical point of the sun.

A = Area of projected surface emitting heat normally
= Area of great circle of sun regarded as a sphere.

Then evidently, at a given distance, we have, Q varies as $R \times A$: hence, taking the example cited from Newcomb (as A varies directly as the square of the sun's diameter), if the temperature of the condensed gaseous mass is doubled by contraction to one-half its primitive diameter, its area (or A) would be reduced to one-fourth its original area; so that, notwithstanding the assumed augmentation of temperature of the sun, the supply of heat received by the earth (or $R \times A$) would not be increased, unless R augmented in a ratio greater than the square of the temperature. It is difficult to assign precisely what function R is of the temperature of the radiating body: some physicists (Rossetti) make it proportional to the square of the absolute temperature; while others (Stephan) make it as high as the fourth power of the absolute temperature.

JOHN LECONTE.

Sphere anemometer.

I am rather amused to see in SCIENCE, p. 228, that Dr. Sprung of Hamburg has re-invented an anemometer well known (but not used) in this country; viz., Howlett's. Dr. Sprung, and all who wish to help forwards our knowledge of wind-force, should begin by making themselves acquainted with what has already been done. In the *Quarterly journal of the meteorological society*, viii., p. 161, will be found an Historical sketch of anemometry and anemometers, by J. K. Laughton, M.A., F.R.G.S., president meteorological society, and in it will be found notices of about two hundred patterns. The full description of Howlett's is given in the *Proceedings British meteorological society*, iv., p. 161; but even Howlett was not the first to use the sphere; for in Mr. Laughton's address he remarks, "The sphere as a pressure-plate at the end of a swinging rod had been suggested, and possibly used, many years before Mr. Howlett's time, as a rude anemoscope. It is mentioned vaguely by Hülse (*Allgemeine maschinen encyclopädie*, under anemometer) in 1841, and is said by Mr. Bender (*Proc. inst. civil engineers*, March 14, 1882) to have been used by Parrot; but this I have not been able to verify."

G. J. SYMONS, F.R.S.

62 Camden Square, London N.W.,
May 19, 1883.

SCIENCE AND RELIGION.

Studies in science and religion. By G. FREDERICK WRIGHT. Andover, *Draper*, 1882. 16+390 p. 16°.

WE hail the appearance of a book on this subject by one who is an earnest worker in both theology and science as a sign that the unnatural conflict between these two great departments of thought will speedily abate, and their differences be adjusted on a rational basis. The conflict is, in our opinion, the

result of narrowness and dogmatism on both sides, and will never end, until, on the one hand, theologians not only acquaint themselves with the *facts*, but deeply sympathize with the *spirit* of science, and, on the other, scientific men not merely retain in memory from childish days some extreme forms of religious dogmas, but enter deeply and lovingly into the profound truths which lie at the root of these dogmas. The author certainly deserves the thanks of all fair-minded men for the judicial spirit in which he treats the points in dispute.

As indicated by the title, the book is not a systematic treatise, but rather a collection of essays written at different times, but following a continuous line of thought. Chapter i., as introductory to all the rest, treats of the ground of validity of induction. In this the author shows that both scientific and religious beliefs rest on induction. In both we attain, not demonstrative certainty, but probabilities of all degrees. In both we demand only the best working hypothesis. Having thus in his first chapter laid a foundation, in his second and third he takes Darwinism as an example of scientific induction, and gives a discussion which is so fair that Darwin himself, we are sure, would be satisfied. In the fourth chapter he discusses the question of evidence of design in nature, and shows that Darwinism is not, as some suppose, destructive of the doctrine of design and final causes, but only elevates and ennobles our conceptions of the designer, or, to use his own words, that "there is a divinity that shapes the ends of organic life, let natural selection rough-hew them how it will."

The impression received from reading these chapters is that the author, while not championing the cause of Darwinism, believes that some form of evolution—i.e., the origin of species by derivation with modification—is extremely probable. Yet he clearly sees (as every one ought to see) that the origin of species by derivation need trouble the theologian no more than the origin of any thing else by secondary processes.

In the fifth chapter the author runs a remarkable parallel between Darwinism and Calvinism, showing how both insist on absolute continuity and reign of law, how in both individual ends are sacrificed to general ends, and how both, if carried to extreme, tend to fatalism. In both, also, we are brought face to face with the same irreconcilable antithesis; for, if one strives in vain to reconcile the freedom of man with the absoluteness of God, the other

must strive in vain to show how the free will of man is consistent with the invariableness of law. Our own view on this subject is briefly this: there are two modes of viewing nature, which may be called the religious and the scientific. According to the one, God in nature operates nature, but according to regular laws, which we call the laws of nature; according to the other, nature, for all practical purposes, may be regarded as operating itself. Both of these views are, we believe, legitimate. When we deal with nature, we practically must hold the latter; when we retire to the inner sanctuary of philosophic thought or religious emotion, we must hold the former. The one is the necessary work-clothes of our *outdoor life*, which we must put off when we return home to enjoy our *inner life*. For finite man this apparent inconsistency—this daily change of clothing—is the truest wisdom. But those who *will* be logically consistent in detail, even at the expense of one-half of all philosophy, run, on the one hand, into *extreme Calvinism*, or, on the other, into *universal automatism*,—the one a spiritualistic, the other a materialistic fatalism.

Chapter vi. is a really admirable *résumé* of the question of prehistoric man,—his relation to the glacial epoch, and his probable antiquity. This being the field of his own scientific work, the author is here at home; and geologists will read this chapter with especial interest as an authoritative statement of the latest and best views on the subject of the glacial epoch in America, and especially of the course and character of the ice-sheet moraine. In fact, it is to our author, in connection with Professors Chamberlin, Upham, and Lewis, that we are chiefly indebted for tracing the ice-sheet moraine through the United States, and thus generally settling the fact of the former existence of such an ice-sheet.

As to the antiquity of man: while his existence during the latter portion of the quaternary, and his coexistence with a now extinct mammalian fauna, is admitted, yet reasons are given for the belief that the time elapsed since the glacial epoch is much less than usually supposed by geologists. The author thinks that the flooded rivers and lakes which characterized the close of the glacial epoch, and which were undoubtedly seen by man, may not have been more than ten thousand years ago. For our own part, while we believe that some years ago there was too strong a tendency, on the part of many geologists of the uniformitarian school, to stretch the time beyond reasonable limits, yet recently in this country the ten-

dency has been, perhaps, too much the other way. Ten thousand years seems a short time for the completion of such great changes as we find in river-beds, in lake-margins, and in mammalian species.

In the last chapter the author discusses the relation of the Bible to science. Perhaps the time is not yet fully ripe for final adjustment here. But one thing is meanwhile certain: all the harm which has come, or will ever come, of the discussion of this subject, comes only of a narrow, intolerant spirit on both sides. Nothing but good can come of the freest inquiry, if only it is conducted in a simple, reverent, truth-loving spirit.

But as many will think that a reviewer is 'nothing unless critical,' we must find some faults, even if they be but errors of typography, or slips of the pen. Of the former, we find one on p. 329, where 70° instead of 20° from pole is given as the position of the antarctic continental ice-foot. Among the latter, we notice on p. 310 that the bluff-deposit of the Mississippi River is spoken of as the 'orange sand.' The bluff-deposit is a very fine silt (loess) overlying the coarse orange sand. Again: the transition from paleozoic to mesozoic can hardly be called 'one from water-breathing to air-breathing animals,' since air-breathing insects lived in the Devonian, and air-breathing insects and amphibians were abundant in the carboniferous.

Finally, we should state that the book is illustrated by several plates, which greatly increase its value.

THE TOPOGRAPHICAL MAP OF NEW JERSEY.

A topographical map of a part of northern New Jersey, from surveys and levellings made, and local surveys corrected. By GEORGE W. HOWELL, C.E., and C. C. VERMEULE, C.E. *Julius Bien, lith.*, 1882. 87.5×88 cm.

ALL of our state geological surveys have been hampered by a lack of topographic maps on which to record and publish their results. The geological maps thus far completed have in nearly all cases been based on compilations of county and other surveys, executed at different times, on different plans, and seldom with sufficient geodetic triangulation to insure accuracy. Representation of mountain form is in nearly all cases excessively incorrect. When careful topographic surveys have been made, they have unfortunately too often followed instead of preceded the geological examination. As it is now too late to go back and perform the work in proper order, the

next best plan is at least to carry on topographic surveys wherever possible, and secure, as soon as may be, the good results of a close knowledge of the form of the various states. Such work is going on in New York, and a careful triangulation has been carried across the state; but, with the appropriation at present grudgingly afforded this work, many years must pass before it is completed. New Hampshire has taken advantage of a triangulation executed for it by the U. S. coast-survey, and constructed a large six-sheet map on a scale of two and one-half miles to the inch (1:158,400), with contour lines every hundred, and in parts every fifty, feet; but these latter are by no means of final accuracy. This map was issued with geological coloring in 1878; and that part including the White Mountains has been published apart in *Appalachia*, vol. i., uncolored, and also by the surveyor, Mr. H. F. Walling, with hypsometric coloring. Another notable contour-line map is that of 'Morrison's Cove,' surveyed by Mr. R. H. Sanders, to illustrate Mr. Fr. Platt's report on Blair and Huntingdon Counties, Penn. (*Second geol. surv. Penn.*, T., 1881). It is printed in fourteen large sheets, on a scale of sixteen hundred feet to an inch (1:19,200), or about three and one-half inches to a mile, with contours every twenty feet, and is colored geologically. Being in a region of typical Appalachian form, it has an especial value in showing this remarkably interesting style of mountain surface. A photographic plate from a model constructed from this map by Mr. E. H. Harden has been published (*Proc. Amer. phil. soc.*, xix. 1881), and gives a finer view of the intricacies of Pennsylvanian topography than any thing else that has yet appeared. It is to be hoped that the other models constructed for the Pennsylvania survey may be treated in the same way. A second example of fine topographic work on the same large scale is in the lately issued map of the Panther Creek basin by Mr. R. P. Rothwell (see *SCIENCE*, p. 310), which makes the first of a series of maps that will illustrate the survey of the anthracite district of Pennsylvania, in charge of Mr. Ashburner. The large number of accurate surveys of private property in this region, and the numerous railroads crossing it, will furnish a valuable basis for the final work of the state geologists, and its interesting form and unique structure will at last find adequate representation.

The topographic map now in course of construction and publication by the Geological survey of New Jersey, under the direction

of Prof. G. H. Cook, bids fair to outrank those already mentioned, as it alone combines all the elements for successful completion. It has the advantage of thorough triangulation, including twenty-six primary stations furnished by the U. S. coast-survey, — a work still in progress, but approaching an end. This is illustrated by a very delicately prepared map in Professor Cook's annual report for 1882. The process of local triangulation and levelling was begun in the northern part of the state, and field-observation is already done for most of the area lying north of a line from Belvidere to Sandy Hook. The area of which the sheets have been published contains 847 $\square$ miles of New-Jersey land, and laps eastward on New York. Its centre is near Orange, and it includes Paterson and Perth Amboy north and south, and Brooklyn and Boonton east and west. The scale is one mile to an inch (1: 63,360), sufficiently detailed to show all the artificial topography even in the city portions of the map, and to include many of those mythical rectangular streets laid out on town plans, and 'accepted' by the local authorities, although often entirely regardless of the lay of the land. The contours are drawn in faint red lines, showing differences of level of ten feet in plain country, and twenty feet in the hilly portions. Water-surfaces are colored blue, and depth-lines are drawn at intervals of ten feet. The chief topographic features thus shown are the strong, regular lines of the triassic trap-ridges, — the Palisades and the double Wachung Mountains, — with their bold eastern face and long slope, on the west; the more irregular highland country of the azoic rocks, on the north-west; the great area of salt-marsh lands, built up to tide level along the Hackensack River and Newark Bay; the extensive fresh marshes and flats on the upper course of the Passaic, within the curve of the Wachung range, — the remains of an old lake held by drift-barriers, as explained in the report for 1880; and, finally, the line of the terminal moraine, especially as it crosses the flat sandstone country from Metuchen northward to Locust Grove, where it climbs the trap-range. Even in this short distance, over forty of its characteristic little ponds, that would be quite unnoted on ordinary maps, are shown upon its rolling back. The completion of this map for the entire state will be an immense gain for its people.

The distinctly practical ends that mark the work of the New-Jersey survey justify the subordination of natural to artificial topography; the former being mostly indicated in the fainter

red, and the latter in the stronger black lines. It would be, however, of much practical as well as scientific interest to try a reversal of these colors on a special edition of the map, in order to show more distinctly the natural features of the state, and give a properly secondary place to the towns, railroads, and lettering. As now printed, the ridges of the Wachung Mountains are rivalled by the Central railroad with the parallel roads beside it; and the mountain form is obscured, except to a very close search, among the streets of Orange and Paterson. And, as where so much good work has been accomplished we naturally look for more, it seems not too much to hope that future years may see the entire map appear with geological colors, in which the detrital surface-deposits are shown, as well as the consolidated underlying formations, the latter being indicated only where they outcrop, or are covered by an insignificant soil.

CRUSTACEA OF THE BLAKE AND TRAVAILLEUR EXPEDITIONS.

Recueil de figures de crustacés nouveaux ou peu connus. Par M. A. MILNE-EDWARDS. 1ère livraison. [Paris], April, 1883. 3 p + 44 pl. 4°.

THE coast-survey dredgings, under the direction of Pourtalès, in the Straits of Florida, first revealed the wonderful richness of the crustacean fauna beyond the shallow waters of our southern coast. The earlier collections of Pourtalès were unfortunately lost in the great Chicago fire; but Stimpson's preliminary report on the Brachyura, published in 1870, gives some indication of their extent. The subsequent explorations, under the direction of Pourtalès, the elder Agassiz, and Stimpson, more than replaced the collections destroyed at Chicago; while the work of the Blake, under the direction of Alexander Agassiz, in 1877, 1878, 1879, has far excelled all earlier explorations in bringing to light great numbers of new and remarkable forms. All the crustacea from these later explorations have been submitted to Alphonse Milne-Edwards of Paris, who has from time to time described and figured a considerable number of the Brachyura in his great work on the crustacea of Central America and the Mexican region. The progress of this work has been exceedingly slow, however, the Carcinoplacidae not yet being reached; so that the groups containing the most remarkable forms were left untouched until the appearance of the preliminary report on the Blake crustacea in the bulletin of the Museum of comparative zoölogy. This short report, though extending only to the higher Macrura,

enumerates over two hundred species, and characterizes as new to science twenty-eight of the genera and more than a hundred of the species. As a continuation of this report, preliminary notices of more of the *Macrura* appeared in the *Annales des sciences naturelles* for 1881. The explorations of the *Travailleur* on the other side of the Atlantic in 1880, 1881, 1882, have also brought to light numerous new forms, which have been briefly described or mentioned by Milne-Edwards in several reports upon the work of the *Travailleur*. These preliminary reports of Milne-Edwards, though they revealed astonishing discoveries, gave very little idea of the strange new forms discovered; and the accumulation of such a mass of imperfectly described genera and species was fast becoming a serious obstruction to the work of others in the same department. The work which is the subject of this notice begins to obviate this difficulty by the issuing of advance figures of the new forms referred to.

This first fasciculus of the work consists of a titlepage and a two-page list of plates printed by some autographic process, and forty-four plates, of which thirteen are engraved, and the rest printed like the titlepage and list of plates. The engraved plates are all proofs before letter, and represent species from the *Travailleur* expedition only, while the autographic plates represent species from both *Travailleur* and *Blake* expeditions, and a few from other sources. None of the plates are numbered in any way, — an unfortunate omission, which renders references to them difficult; but the names of the species are printed on them, and on the autographic plates the station and depth are usually added. The whole number of species figured is sixty-one; of which thirty-one are from the *Travailleur*, twenty-six from the *Blake*, three from the U. S. fish-commission, and one from the Godeffroy museum. The autographic plates, though rough in appearance, are apparently quite as accurate as the highly finished engravings, and have the great advantage of showing the work of the draughtsman only.

The most remarkable forms figured are from the *Blake* collection. *Phoberus caecus*, one of these, a *Macruran* as large as the lobster, resembles *Palaemon* in external form, but has rudimentary eyes not projecting beyond the carapax, and is said to have branchiae like the *Astacidae*. *Xylopagurus rectus* is a hermit-crab, which inhabits tubular stems of plants open at both ends, has a bilaterally symmetrical abdomen with the penultimate somite developed into a calcarous operculum, which closes

the posterior opening of the tube. *Pylocheles Agassizii*, another hermit-crab, lives in cavities in hard fragments of agglutinated sand, and has a well-developed, symmetrical abdomen like the typical *Macrura*. One of the most interesting types is *Glyphocrangon*, represented by three species, the figures of which well illustrate the utility of figures and the slight value of Milne-Edwards's preliminary descriptions. The figures show *Glyphocrangon* to be the same as my *Rhachocaris*, figured and described in a report on the *Blake* crustacea of 1880 (*Bull. mus. comp. zool.*, x.). The genus was described by Milne-Edwards as having the telson completely consolidated with the preceding somite; which is not the case, the telson having a movable, though peculiarly constructed articulation, which is like the articulations between the three preceding somites of the abdomen. The structure of these articulations, which seem to have been wholly overlooked by Milne-Edwards, is so remarkable that I quote the following from my original description: —

"In addition to the ordinary hinge at each of the articulations, there is a process arising from the anterior somite just below the hinge, and curved backward and upward concentrically with the hinge; and this process fits accurately, and is slightly overlapped along its edges by a similarly curved groove in the posterior somite. When the abdomen is completely flexed, the ends of these curved processes project dorsally considerably beyond the grooves; but, when the abdomen is fully extended, the processes are withdrawn so as to expose the dorsal part of the groove; and in this position, in the contracted alcoholic specimens, the somites are firmly clamped, apparently by the pressure of the ends of the processes upon the concave posterior walls of the grooves, and held rigidly extended, so that it is very difficult to flex the somites, unless the tip of the abdomen is pulled backward with considerable force, when the processes slide easily through the grooves, and the somites are readily flexed. It is probable that in life, while the extensor muscles of the abdomen are relaxed, the processes move easily through the grooves; but, when the extensor muscles are strongly contracted, the hinges are clamped, as in the alcoholic specimens, so that the animal can voluntarily hold the telson and the spiny terminal somites of the abdomen rigidly extended as a means of self-defence."

Another remarkable peculiarity of the genus, not noticed by Milne-Edwards, is the articulation of the coxae of the external maxillipeds with the edges of the carapax. *Pontophilus Jacqueti*, from the *Travailleur* expedition, is evidently not a *Pontophilus*, but a *Ceraphilus*, and is apparently identical with my *C. Agassizii* from this side of the Atlantic.

Nearly half of the species figured apparently belong in or near *Pandalinae* and *Ephyrinae*, which seem to be the most abundant of the deep-water *Macrura*. S. I. SMITH.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Siemens on solar physics.—In a recent lecture at the Royal Institution, Sir. W. Siemens discusses the subject of solar radiation. He gives reasons for fixing the temperature of the photosphere at about 2800° C., based, first, upon the behavior of a rod of carbon and a gas-flame in the focus of a reflector exposed to the sun; second, upon a comparison between spectra of different luminous intensities; and, third, upon experiments for determining the relation between temperature and radiation made by means of an iridio-platinum wire a metre long, heated by an electric current. He finds the radiation to be expressible by the formula, $Radiation = Mt^2 + \phi t$, M being a coefficient due to the radiating substance. He discusses also the effect of diminished pressure in lowering the dissociation temperature of compound gases, and restates and advocates anew his last year's theory of the maintenance of the solar heat. — (*Nature*, May 3.) C. A. Y. [1061]

Scintillation of stars as affected by the aurora borealis.—M. Ch. Montigny, observing for many years at Brussels, has noticed, as previous observers have done, that the scintillation of stars is much increased during the occurrence of an aurora. He has noticed, further, that every aurora 'produces immediately its effects upon the scintillation,' that stars in the north are most affected, and that the influence of the phenomenon is most marked for the stars which are observed across the upper regions of the air. Magnetic disturbances also, even when accompanied by no aurora visible at Brussels, increase the scintillation to a marked extent. On two occasions during July, 1881, the effect of magnetic disturbances was observed with no aurora visible in Brussels, or even, so far as can be learned, in any part of Denmark. — (*Comptes rendus*, Feb. 26.) E. H. H. [1062]

Deviation of axis of meridian-circle.—M. Loewy of the Paris observatory gives two new methods of determining the azimuth constant of a meridian-circle. The first method depends on the following principle: if we take two points in the path of a star so that the chord joining them is approximately at right angles to the instrumental plane, and not greatly different in length from the polar distance, the inclination of the instrumental axis to the equator can be determined by readings of the instrumental declination and distances from the instrumental plane. Owing to the limited field, only those stars whose polar distances are about 1° 40' or less can be used. About one hour and forty-six minutes before meridian-transit, simultaneous readings of the right ascension and declination micrometers are made, and also a reading of the circle. It is not necessary to record the time. After an interval of about three hours and a half, the series is repeated. The chord of the path described by the star during this interval will equal its polar distance. From these observations, we can deduce the inclination of the instrumental axis to the equator, and by means of this the azimuth constant, without using the right ascension of the star. The method gives thus an independent determination of the azimuth. The old method, that of upper and lower culminations of the same star, requires an interval of twelve hours, thus greatly increasing the uncertainty of the determination on account of instrumental changes; besides, for a large part of the year it can be applied to only one star, α Ursae Minoris.

M. Loewy's second method, which he does not

consider as good as the first, depends on observations of the distance of the star from the instrumental plane, time of observation being accurately noted. When both right ascension and inclination of axis are sought, it is best to observe these polars at an hour angle of about three hours. When the interval between observations is twelve hours, the inclination of the axis can be determined independent of the right ascension.

M. Loewy gives some results of determinations of inclination by his first method which show a very close agreement with the results given by that ordinarily employed. He believes that the probable error of his method will not exceed 0°.02. — (*Comptes rendus*, April 16 and 23.) M. Mc N. [1063]

MATHEMATICS.

Spherical representation of surfaces.—In a series of previous communications, M. Darboux treated the particular case of spherical representation when the spherical images of the lines of curvature form an orthogonal and isothermal system. In the present communication, he shows how the method previously employed conducts to the complete solution of the problem of spherical representation whenever this solution can be obtained in finite terms. Employing certain propositions due to M. Montard, the author arrives at the conclusion that we can obtain all the cases in which the problem of spherical representation is susceptible of a solution in finite terms, and that, whenever the problem of spherical representation has been solved in any manner for a system of orthogonal curves, we can derive from the obtained solution an entire unlimited series of orthogonal spherical systems. — (*Comptes rendus*, Feb. 5.) T. C. [1064]

Motion of a material point.—In concluding a paper on a certain peculiar case of the motion of a material point, M. Gascheau considers the problem of finding the equations of motion of a material point acted upon by a central attractive force, varying inversely as the cube of the distance from the point to the centre of action. The trajectory is shown to be an hyperbolic spiral. The curve itself is discussed, and a formula is obtained for its rectification. Special phases of the motion of the point are also investigated. — (*Bull. soc. math.*, x. no. 7.) T. C. [1065]

Partial differential equations.—It is impossible to do more than call attention to this memoir by M. Lemonnier, which treats of the integration of partial differential equations of the first order in n independent variables. The process followed is new, and decidedly simple and interesting; but an abstract can scarcely be given here without introducing a good deal of algebraical work. — (*Bull. soc. math.*, x. no. 7.) T. C. [1066]

A differential equation.—Capt. MacMahon considers the differential equation,

$$X^{-\frac{2}{3}}dx + Y^{-\frac{2}{3}}dy + Z^{-\frac{2}{3}}dz = 0,$$

where X and Y are cubic functions of x and y respectively. The equation obtained from the above by dropping out the term in z has been investigated by Allegret (*Comptes rendus*, lxvi. p. 1144), who has obtained the integral in an irrational form. If a denote the constant of integration, Allegret's result is symmetrical in x , y , and a . Capt. MacMahon puts a equal to z , and obtains a solution of the above equation in the form of a rational algebraical integral.

Prof. Cayley adds an interesting note to this paper.
— (*Quart. journ. math.*, Feb.) T. C. [1067]

PHYSICS.

Optics.

Reversal of hydrogen-lines.—Liveing and Dewar communicate to the Royal society an interesting note, showing, that, when the induction-spark is taken between electrodes of aluminium at a pressure of two or three atmospheres, the reversal of *F* is easily obtained; that of *C*, only with difficulty. By spiriting fine drops of water with a pipette into the electric arc, the hydrogen-lines become brilliantly, and, so to speak, 'explosively' visible for an instant, but without any reversal. — (*Nature*, May 3.) C. A. Y. [1068]

(Photography.)

Iodide of silver in the emulsion.—Herr Schumann has been experimenting on emulsions sensitized by combinations of the iodide and bromide of silver. Capt. Abney, Dr. Eder, and Dr. Vogel found that the introduction of iodide diminished rather than increased the sensitiveness of the emulsion, while Herr Schumann obtained the opposite result. He now finds the cause of this discrepancy to be, that while the former authorities prepared their iodide and bromide emulsions separately, and then mixed them, in order to obtain accurate quantitative results, he has been in the habit of precipitating the two together in one and the same solution, as would be done in the practical working of the process. As prepared by the former method, the emulsion is of a pale yellow color; while, by the latter, it is darker and of a citron-yellow tint. The sensitiveness of the mixed emulsions is at a maximum in that portion of the spectrum lying between *F* and *G*. It has a lower maximum in the vicinity of the *H* line, and is practically insensitive to the region half way between *G* and *h*. The spectrum of the combined emulsion differs from the above in having a distinct maximum between *b* and *F*, and in its much greater sensitiveness to the less refrangible rays. — (*Brit. journ. phot.*, April 27.) W. H. P. [1069]

Photographing the vocal organs.—Messrs. H. T. Wood, Behnke, and Cadett have recently succeeded in photographing the vocal organs in action. An electric light and laryngoscope were employed. It was necessary, in these experiments, to so arrange the light, that the singer should at the same time be enabled to see that the mirror was in the proper position, and also that the image was reflected directly into the camera lens. The light was placed by the side of the camera, and a little in front of it; and the rays were directed by means of a condenser upon a mirror placed immediately above the lens; this mirror being set at an angle of 45° so as to direct the light upon the subject. The condenser was furnished on the side next the lamp with a water-jacket, through which a current of water was kept flowing to prevent injury to the lens from the heat of the lamp. The rays from the first mirror were received upon the small laryngoscopic mirror placed at the back of the throat, and the image formed in this was reflected upon another small mirror fixed to the front of a drop-shutter; the object of this arrangement being to enable the person whose organs were being photographed to see when the image was properly directed. When this was done, he gave the signal to the operator, and the exposure was made. In some of the latter experiments, arrangements were adopted by which a pair of stereoscopic lenses

could be used, one lens serving as a finder, and the other producing the picture. — (*Brit. journ. phot.*, April 13.) W. H. P. [1070]

Electricity.

Resistance of the electric arc.—Ayrton and Perry, experimenting upon the electric arc between carbon poles, employing at times a battery of Grove cells, and at others a Brush dynamo, find, like Schwendler, that the resistance of the arc, including under this head both the resistance proper and the opposing electromotive force at the carbon surfaces, is nearly inversely proportional to the current. The following is given as a sample of the results obtained from a number of tests with Grove cells:—

No. of cells.	Current, in amperes.	Difference of potential between carbons, in volts.	Work, in foot-pounds, per second in arc.
30	6.52	30.4	146.2
40	10.16	30.4	227.8
50	11.92	30.4	267.2

Other experiments showed, that, when a given current was trebled, the difference of potential between the poles was slightly increased. The authors have also tested the relation between length of the arc and the difference of potential between the poles. A large number of experiments were made for this purpose with a Brush machine, giving currents varying between 5.5 and 10.4 amperes, the distance between the carbon points varying between 0 and 1½ inches, and the difference of potentials from 0 to 140 volts, the carbons being 0.24 inch thick. The results are plotted, giving a curve for which the approximate equation is, —

$$E = 63 + 55a - 63 \times 10^{-10a},$$

where *E* is the difference of potentials in volts, and *a* the distance between the points in inches. — (*Phil. mag.*, May.) E. H. H. [1071]

ENGINEERING.

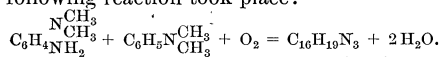
The steamer City of Fall River.—The steamer City of Fall River, which has been recently added to the Fall River line between New York and Boston, exhibits some decided innovations. The engine, of 2,000-horse power, was designed and built by Messrs. A. & W. Fletcher of New-York City. It is a compound beam engine, fitted with the Morgan feathering paddle-wheels, and supplied with steam by a Redfield boiler, all of which features are unusual. The steam-cylinders are 44 inches diameter by 8 feet stroke, and 68 inches by 12 feet stroke. The wheels are 25 feet 6 inches in diameter. The boilers are of Otis steel, and are tested to 150 pounds pressure per square inch. The boat is 260 feet long, 41 feet beam, 17 feet deep. Over the guards the breadth is 73 feet. The draught of water, loaded with 600 tons of freight, is 12 feet. This steamer has made the 181 miles from port to port in 10½ hours, and has made 17 miles an hour. The coal consumption is small,—20 tons per round trip. — (*Sc. Amer.*, May 5.) R. H. T. [1072]

CHEMISTRY.

(Organic.)

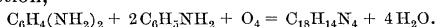
Oxidation of aromatic monamines and diamines.—When equal molecules of dimethylparaphenyldiamine and dimethylaniline in an aqueous solution with zinc chloride were treated with the

quantity of potassic bichromate required to furnish two atoms of oxygen, R. Bindschedler found that the following reaction took place:—



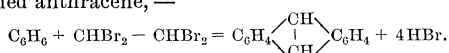
Dimethylphenyl green.

Tetramethylphenylsafranin ($\text{C}_{22}\text{H}_{18}\text{N}_4$) resulted when aniline was substituted for dimethylaniline. With two molecules of aniline, dimethylparaphenyldiamine gave dimethylphenylsafranin ($\text{C}_{20}\text{H}_{18}\text{N}_4$). Phenylsafranin was formed in the reaction, —



—(*Berichte deutsch. chem. gesellsch.*, xvi. 864.) C. F. M. [1073]

A new synthesis of anthracene.—By means of the aluminum chloride reaction, using benzol and tetrabromethan, R. Anschütz and F. Eltsbacher obtained anthracene, —



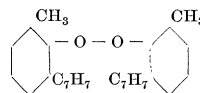
—(*Berichte deutsch. chem. gesellsch.*, xvi. 623.) C. F. M. [1074]

Derivatives of meconic acid.—In Kolbe's laboratory a series of compounds has been obtained by Ost, which he regards as derivatives of the hypothetical body *pyridon* ($\text{C}_5\text{H}_5\text{NO}$). Pyromekazonic acid ($\text{C}_6\text{H}_3\text{NO} \begin{array}{c} \text{OH} \\ | \\ \text{OH} \end{array}$) was made by the action of hydriodic acid upon oxypyromekazonic acid. It resembles the hydroquinones in that by careful oxidation pyromekazon ($\text{C}_6\text{H}_3\text{NO} \cdot \text{O}_2$), a substance analogous to the quinones, is formed. When treated with ammonia, comenic acid was converted into comenaminic, ($\text{C}_6\text{H}_3\text{NO} \begin{array}{c} \text{OH} \\ | \\ \text{COOH} \end{array}$). Oxycomenic acid gave oxycomenaminic ($\text{C}_5\text{H}_2\text{NO} \begin{array}{c} \text{OH} \\ | \\ \text{COOH} \end{array}$), which, by further oxidation, was converted into azoncarboxylic acid ($\text{C}_5\text{H}_2\text{NO} \begin{array}{c} \text{O}_2 \\ | \\ \text{COOH} \end{array}$). All the oxygen in comenaminic acid was replaced by chlorine when the acid was heated to 100° with phosphoric pentachloride, with the formation of pentachloropicoline ($\text{C}_5\text{H}_2\text{Cl}_2\text{NCCl}_3$) and hexachloropicoline ($\text{C}_5\text{HCl}_3\text{NCCl}_3$). Monochloropicoline ($\text{C}_6\text{H}_5\text{ClN}$) was the chief product of the reduction of the acid by sodium amalgam. The decomposition products of comenic acid, when treated with phosphoric pentachloride, were perchlormekylen (C_5Cl_6) and hexachlorethan (C_2Cl_6). —(*Journ. prakt. chem.*, xxvii. 257.) C. F. M. [1075]

Spontaneous decomposition of oxalic acid.—On allowing a dilute solution of oxalic acid containing .4 to .6 gm. to the litre to stand for several years in a closed vessel, G. Fleury found that the solution lost its acid reaction. Large clusters of a vegetable growth had developed, similar to that often observed in tartaric acid. In a more concentrated solution (6.3 grms. to the litre) there was no appreciable change at the end of four years. —(*Journ. pharm. chim.*, 1883, 388.) C. F. M. [1076]

New bodies from coal-tar.—In fractionating a sample of coal-tar, H. Schwarz obtained a distillate between 320° and 330° which solidified. By fractional crystallization he separated three products which melted respectively at 95° , 104° , and 124° . Analysis showed the same percentage of carbon and hydrogen which corresponded to the formula $\text{C}_{28}\text{H}_{26}\text{O}_2$. Oxides of the composition $\text{C}_{14}\text{H}_{11}\text{O}_2$ were formed by oxidation; and by nitration they gave heptanitro-products. The three substances were therefore des-

ignated as α -, β -, and γ -pyrocresols. The name pyrocresol was adopted provisionally, since further study is necessary to establish their constitution. The author thinks they may be forms of a ditolylditol-ylenoxide, —



—(*Sitzungsberichte kais. akad. Wien*, lxxxvi. 835.) C. F. M. [1077]

METALLURGY.

Lead-smelting at Altenau, Upper Hartz.—The low grade of the available lead ores, and the failure of the iron-rich copper slags from Oker, have necessitated a change in the process of smelting. The method now used is as follows: the ores are roasted in a single hearth reverberatory furnace until changed to oxide and silicate of lead, then smelted in a blast-furnace with the addition of 20% of raw ore to make a matte of all the copper. The ore must be crushed quite fine, namely, not over 2 mm. in size, and should contain about 15% of silica to 60% of lead, to give the best results in roasting. The charge for the blast-furnace is planned for a lime-iron slag. The lime-slag, which was at first tried, failed on account of the amount of zinc present. The cost of this process is not much less than the old method; but the Oker residues are at present used elsewhere, and are consequently not available, and, besides this, the furnace smoke is avoided. The process yields 98.5% of the lead, and the yield of silver is larger than the fire assay indicates. —(*Zeitschr. berg-, hütt.-sal. wesen*, xxxi.; *Eng. min. journ.*, March 24.) R. H. R. [1078]

GEOLOGY.

The coal and mineral fields of Indo-China.—E. Fuchs, ingénieur en chef des mines, gives a long account, with maps and sketches, of his mission to Cochinchina, assisted by E. Saladin. The following formations are figured on the general map: granitic rocks, porphyritic rocks, volcanic rocks, ancient rocks, carboniferous or Devonian limestone, coal-basins, variegated sandstones and clays. The ancient rocks referred to the Silurian are unfossiliferous. The overlying schists and sandstones are referred to the Devonian; they contain fragments of a large crinoid, and imperfect impressions of a bivalve, probably an *Orthis*; and they are frequently cut by veins of quartz, which are sometimes auriferous. The carboniferous limestone plays an important part in the geology of Indo-China: it is five hundred or six hundred metres thick, and contains fragments of *Zaphrentis*; it is a fine-grained, compact, crystalline limestone, and might be utilized as a marble. Re-tiling in discordance of stratification on this, is the thick clay and sandstone formation, which at its base contains the coal-beds whose study has been the chief object of the investigation. The base of the system is characterized by the felspathic nature of its sandstones, and their prevailing gray color. The principal coal-basins actually found are those of Tong-King, of Yun-Nan, of the province of Tinh-Hoa, of Nong-Sön (Annam), and of Laos; notably, that of Bas-ac, on the Mé Kong. Above the coal-beds come the series of variegated sandstones and clays; their thickness is estimated at a thousand metres; they contain no fossils, but beds of salt-bearing clays, and sandstones impregnated with copper. The upper mesozoic and tertiary beds have not yet been found in Indo-China.

The ancient and modern alluvial deposits are very extensive. The exploration failed to find the zinc and copper localities that were mentioned to them in Tourane, and did not extend so far as to reach the important tin-veins of Laos and Yun-Nan.

Mr. Zeller, in his study of the fossil flora of the coal-beds of Tong-King, from material brought back by Mr. Fuchs, and in part collected by Mr. Douzans, reports twenty-two species, of which two are new. Out of the twenty remaining, ten are identical with European species, confined exclusively to rhetic beds. Of the remaining species, five belong to the lower Gondwanas, and four to the upper Gondwanas, while one belongs to both. From this there would seem to be strong reason for considering the coals of Tong-King as of rhetic (upper triassic) age, having analogies with the coals of India (Gondwanas), of South Africa (Karoo series). The coal-basin of the Ternera in the desert of Atacama, between Chili and Bolivia, also contained only rhetic species; and in our own country we have probably analogous beds in the Richmond and North Carolina trias (cf. 1086). — (*Ann. des mines*, (8), ii. livr. 5.) J. B. M. [1079]

Glacial depression of Scotland. — R. Richardson reviews all the localities at which arctic shells have been found associated with the drift in Scotland, and shows that arctic species not now living in the British seas have been discovered at various high levels throughout Scotland, ranging from 90 to 510 feet above tide at fourteen stations. At lower levels, such discoveries have been much more frequent. The shells are generally referred to interglacial deposits. A neatly drawn map illustrates the paper (*Trans. Edinb. geol. soc.*, iv. 1882, 179). In the same volume, D. Milne-Home devotes part of his inaugural address to the evidence favoring the iceberg theory, stating, that, when due regard is paid to the general south-easterly transport of bowlders at various parts of the United Kingdom, it is difficult to account for such an extensive operation, except by bergs floating in the sea over the submerged land (*Ib.*, 124). — W. M. D. [1080]

Glaciation of Norway. — H. M. Cadell describes the plateau mountains of Norway as an old surface of denudation, now lifted above its former base level of erosion, and greatly roughened by subsequent erosive action. He agrees with Penck in maintaining that there is a fundamental difference between Swiss and Norwegian glaciers; the former originating in sloping fields of *névé*, while the latter are overflows of upland ice-sheets. Three glaciers descend from the ice of the Folgefond, and twenty-three from the great Justedal ice-plateau. These upper sheets are regarded as small examples of the present Greenland ice, and as remnants of what once 'extended over the whole of northern Europe.' The fiords are described as 'most typical examples of true ice-formed rock-basins,' and it is stated that there is no evidence of fracturing or faulting in the rocks about them (although Kjerulf has shown the contrary statement to be true). — (*Trans. Edinb. geol. soc.*, iv. 1882, 227.) W. M. D. [1081]

GEOGRAPHY.

(*Alpina*.)

Hygiene of mountain climbing. — Dr. Brenner advocates exercise in the high, fine air of mountains as the best protection against the diseases contracted in city life. The characteristics of the mountain climate are the low temperature and air-pressure, the low relative humidity, the high per cent of

ozone, the strong light and insolation, the freedom from dust and bacteria. All these act well on the bodily health. The lungs work with greater strength, the heart beats faster, the blood circulates more quickly, appetite is increased, perspiration becomes freer, the muscles become more energetic, and the whole body gains in strength and endurance. — (*Mittheil. deutsch. oest. Alpenv.*, 1882, 284.) W. M. D. [1082]

Geographic nomenclature. — A chapter of definitions of Alpine words used in Trient is contributed by Apollonio, with a valuable pictorial supplement of thirty-seven figures, showing as many types of mountain form. Six cuts illustrate passes, and sixteen are given to peaks, the latter being chiefly of the acute form characteristic of the dolomites. Unfortunately it is not specified whether the figures are taken from nature. The style of work may be commended to our own mountain clubs. — (*Ann. soc. alp. trident.*, viii. 1882, 329.) W. M. D. [1083]

(*Arctic*.)

Arctic notes. — Kunlein's researches among the Eskimo of Cumberland Inlet during the Howgate expedition are summarized and reviewed in the *Deutsche geographische blätter*, heft ii. 172-178. — For the promotion of traffic with Siberia, it is proposed to construct a canal in about latitude 58°, connecting the Yenisei and the Ket branch of the Obi River. The distance is about twenty miles from water to water, but much improvement of the Ket, and a small branch of the Yenisei called the Kas, will be necessary before through navigation will be practicable. An investigation by official engineers is in progress; and, if the difficulties are no greater than anticipated, the work can be rapidly finished, and at a reasonable cost. At present, there are more than fifty steamers on the Obi, while in 1854 there were but two. — The U. S. coast-survey has issued several new charts of the Alaskan coast. One covers part of the coal-fields of Cook's Inlet, and several glaciers bordering on Kachekmak Bay; another includes the codfishing grounds of the Shumagins, the sea-otter region of the south shores of Alaska peninsula, and the peninsula itself from Coal Cape to Issannakh Strait. It is partly compiled from published data, but includes much new and important information on both sides of the peninsula. — The position which should be taken by Germany, in regard to polar research, was discussed at the first day's meeting of the German geographers at Frankfurt, in March. — Karl Pettersen has printed a scheme for international polar expeditions, which includes stations at Bering Strait, North Spitzbergen, and the north-east coast of Novaia Zemlaia, which should be occupied during summer, for ten years, making observations, watching the changing character of the seasons each year, making short expeditions northward, and annually visited by recruiting vessels, which should bring back the staff of observers at the end of the season. Something of this kind has been done by the more intelligent traders and whalers who annually visit these seas, but whose observations are rough, not comparable, and often lost entirely. Still more near to Pettersen's idea is the plan adopted by the Dutch, whose little schooner, the Willem Barents, has just sailed on her sixth cruise in the arctic European seas, and has each season brought back carefully systematized and comparable observations. — The fourth number of the *Mittheilungen* of the international polar commission contains a number of notes and letters from various stations. The Lena station, on Sagastir

Island, is comfortably housed on the right bank of the Sagastir mouth of the river in latitude $73^{\circ} 22' 30''$ north, and east longitude $126^{\circ} 34' 56''$. Fire-wood and whitefish were abundant. November was very clear, with little snow, which interfered with reindeer-stalking. Dr. Bunge, the surgeon, had the misfortune of breaking a rib through a fall, but was doing well, and was visited by many Tungusi, who wished for medical advice. — The last number of the Irkutsk bulletin contains four months' observations of the temperature of the air, by Ivan W. Pavloff, an exile, at the village of Marsha, the period covering August to November, 1882. — A communication from the Danish ministry to the Parliament gives an account of the condition of the colonies in West Greenland for the year 1882. — It is stated that the plans of Dr. Boas for his studies of the Innuit of Cumberland Inlet and vicinity embrace a visit this fall to Iglulik, and a return to Cumberland Inlet *via* the unknown west shores of Baffin Land, wintering at the station; and, next year, an investigation of the little-known tribe of Eclipse Sound and Pond Inlet, returning by the most convenient whaleship. — W. H. D. [1084]

(South America.)

Bove's Patagonian voyage.—Lieut. G. Bove gives a narrative of his unfortunate voyage southward from Montevideo, whence he sailed Dec. 25, 1881, to Santa Cruz, on the eastern coast of Patagonia, Staten Island, the easternmost of the Fuegian Archipelago, and other islands near Cape Horn, until his wreck in Hammacoja (Sloggett's Bay) on May 31, 1882. Santa Cruz is described as the fittest centre for the population of southern Patagonia, having a tolerable anchorage, and fair supply of water and wood, and a climate not too severe. But it is a poor place at best; for the surrounding country is dry and desolate, and the strong currents are continually shifting the sand-bars in its river-channel. The spring tides rise 16 met., and produce a violent bore. Forty days were given to a careful exploration of Staten Island: it is very mountainous, with peaks rising to 850 met., and a deeply indented shore-line; its rocks are mostly schists and quartzites, with nothing more recent than carboniferous strata; evidence of glacial action is distinctly found in old moraines and numerous lakes; and peat bogs of great area occur not only near sea-level, but on the mountain flanks as well. Further description of this region may be given in later reports. The islands next explored near Cape Horn are seldom visited; and one regrets to find so little description given of them in Bove's account, although as a simple narrative it possesses much interest. While the southern islands were extremely barren, a better country was found farther northward along the deep fiords; as, for example, about the successful English mission at Ustchiuvaja, — a fine site, with good anchorage, and sufficient wood and water, and pasturage for cattle, on the On-astchiaga (Beagle Channel). Bove compares the snowy Sarmiento peak (2,300 met.) to the finest of Alpine scenery: it gains from contrast with the sea what it loses in absolute height. Extended glacial action is often referred to; but, in the mention of rounded rocks and abandoned moraines, there is again need of more definite statement. Recent glacial retreat was shown by the interval of 100 met. between the foot of the Negri glacier and its nearest terminal moraine. The final wreck of the vessel was occasioned by the selection of an anchorage, unprotected on the south-east, where a rising storm exposed it to such severe weather and waves, that it was hastily decided that the only chance of safety lay in running ashore.

This was accomplished without loss of life, and much was saved from the stranded vessel. After five days' waiting, their only boat was launched, and a few men returned in it to the English mission above named, whence the mission vessel, Allen Gardiner, was at once despatched, and rescued the entire party on June 10, after they had been somewhat disturbed by a band of natives. A rough outline map, and some views of doubtful accuracy, are among the few illustrations; those of the Fuegians, accompanying the author's special description of the Jagan tribe of the southern islands, being much better. Reports on zoölogy, botany, and geology, by Vinciguerra, Spegazzini, and Lovisato, all members of the expedition, give information of technical value (cf. 1100). — (*Boll. soc. geogr. ital.*, viii. 1883, 5, 89.) W. M. D. [1085]

(Asia.)

Indo-China.—A successful search in certain parts of this peninsula for coal, iron, and gold, gave M. Edmond Fuchs opportunity to note some of its physical peculiarities. Its larger features are: the valley of the Red River (Song-ka) or Tonking, fertile and open, occupied by 12,000,000 inhabitants, and containing valuable coal of early mesozoic age; next westward, the granitic plateau of Laos (Annam), flanked with ranges of ancient slates, abruptly descending to the coast on the east, and with a long slope to the west into the valley of the Mekong, — a great river 1,800 miles long, with a rapidly growing delta, which is included in French Cochinchina. The daily discharge of this stream is estimated at almost 4,000,000,000 cubic metres, with a thousandth part of silt. By the extension of the delta, an old bay between mountain spurs on the north-west has been shut off, and now appears as the great Cambodian Lake, nearly two hundred miles inland. At the time of high water, the Mekong rises some forty feet, and reverses the current in the lake's outlet, flooding it with muddy water, and thus filling the lake from its lower end. Interesting notes are added on the native population, and further details are given on the geology and mineral resources of the vast region (cf. 1079). — (*Rev. scient.*, 1883, 482.) W. M. D. [1086]

BOTANY.

Experiments upon variation in plants.—In the botanical garden in Giessen, Prof. H. Hoffmann has conducted for many years an interesting series of researches upon variation, the results of which have been published from time to time, with little or no comment. The last notice gives a few facts relative to constancy of color, which may be briefly stated as follows: *Adonis aestivalis*, pure red, self-sown for 15 years, 410 plants in 15 generations, without any change of color; same species, yellow variety, no change in 13 generations.

Hieracium alpinum is regarded by Kerner as a plant which cannot thrive on a lime soil. Hoffmann obtained, however, good seeds from specimens grown in soil rich in lime, and afterwards carried on a series of observations relative to the variation of the species in soil both with and without lime. He found the widest variability as regards the branching and leaves; but, with the most divergent forms, he had also in every generation a few perfectly typical plants. — (*Bot. zeit.*, April, May.) G. L. G. [1087]

Pollination of Rulingia.—According to Urban, several species of this Australian genus of Byttneriaceae possess curious adaptations to crossing by insect aid. The flowers are small (one cm. or less in di-

ameter) and whitish. The pistil secretes nectar, which collects about it or in the hollowed petals. At first the stigma is closely covered by five dilated staminodia, closely inflexed over it for a time, but later separate. In *R. pannosa* there is well-marked protandry, the staminodia not separating, nor the stigma maturing, until the stamens are all dehiscent. *R. corylifolia*, on the other hand, is synacmic, the expansion of the sepals and the dehiscence of the stamens occurring in regular succession, and being closely followed by the successive removal of the staminodia from the mature stigma. *R. parviflora* is intermediate between the two species already mentioned. Its flowers assume a rosy color with age, like those of *Trillium grandiflorum*, Weigelia, etc. — (*Sitzungsb. deutsch. bot. ges.*, 1883, i.) W. T. [1088]

Pinus koraiensis Sieb. and Zucc. — Through the kindness of Chief Engineer G. W. Melville, U.S.N., Mr. Josiah Hoopes had received some specimens of this interesting species of pine collected during the voyage of the unfortunate Jeannette. They consist of a branch clothed with foliage, two immature cones, and a few mature seeds from eastern Siberia. The trees were seen along the banks of the Lena, the Yenisei, and the Obi rivers, growing to a height of about thirty feet, with trunks about ten inches in diameter at base. The collector further states that it fruits abundantly, and that the edible seeds are used by the natives as food, and by travellers as nuts. It is interesting to note that this heretofore comparatively rare species has a wider habitat, and is more numerous, than has generally been supposed. Siebold found it in Kamtschatka, and various authors have described it in the list of Japanese Coniferae as a rare introduced species.

This nut-bearing pine is well marked throughout, and especially so in its cones and seeds, the latter being wingless, sub-angulate, flatly compressed, leaving on both sides of the scale, when removed, remarkably deep impressions. The cones are very distinctive, with long reflexed scales, terminating in an abrupt mucro-like apex. Murray, in his *Pines and firs of Japan*, records its height as from ten to twelve feet; but Parlatores, on the authority of Perfetti, gives it as 'sometimes thirty to thirty-three feet.' The latter is corroborated by Mr. Melville, thus indicating that the tree is a true northern species, attaining its greatest size only near the extreme limits of arboreal vegetation. It will, no doubt, make a valuable addition to our list of ornamental conifers, as its hardness is unquestioned, and the foliage is as attractive as any other of the white-pine group, with the exception, perhaps, of *P. excelsa*. In England it has proven reliable, and the small plants cultivated by Mr. Hoopes show evidences of success. — (*Acad. nat. sc. Philad.*; meeting May 8.)

ZOOLOGY.

Cœlenterates.

Recent researches upon the Pennatulida. — As the result of a prolonged study of *Renilla*, Dr. Wilson gives a brief summary of his results and conclusions upon the following topics: the segmentation of the egg and the formation of the germ-layers, the formation of the organs and tissues of the axial polyp, the origin of the community by budding from the axial polyp, the significance of the polymorphism and bilateral symmetry of the community.

During segmentation the division of the nuclei appears to be nearly regular; but the vitellus may either divide with the first division of the nucleus, or it may remain at rest until a much later stage. In some

eggs the first division of the vitellus was into thirty-two spheres. After segmentation the ectoderm is separated by delamination from the solid central endodermic mass, and the supporting layer is secreted from the inner ends of the ectoderm-cells.

The gastric cavity, which has at first no communication with the exterior, is formed by absorption of the central endoderm-cells by those which are more peripherally placed, and the oesophagus is formed as a solid invagination of ectoderm. Its central end is not simply perforated, but absorbed, during the formation of the mouth. The peduncular septum consists of three layers of endoderm-cells, and the author therefore believes that it is morphologically a fused pair of septa. The muscles are developed as processes from the bases of the endoderm-cells; and the cell-body, in many cases at least, becomes reduced to a small granular mass enclosing the nucleus, and closely applied to the side of the muscular fibre. The apicules are developed in the interior of cells, and are of two kinds (ectodermic and endodermic), which differ much in form and size.

The buds which are to form the sexual polyps are developed along the axial polyp in pairs, as two simple lateral rows, and each of them soon becomes a secondary axis for two rows of buds which appear in the angles between the older buds. The law of budding is the same for the zooids and polyps.

The hauptzooid is formed at an early stage as a median bud upon the axial polyp; and its function is to discharge water from the colony, while the other zooids draw in water, as do also the young sexual polyps, but not the adults. Wilson therefore concludes that the zooids are homologous with young sexual polyps; that they are polyps in a state of arrested development. He believes that the polymorphism of the community has not been brought about by the gradual specialization of an undifferentiated community, but that the ancestors of the zooids never possessed a higher organization than at present. He believes that the bilateral symmetry of the community has been directly determined by the bilateral environment, and he holds that *Renilla* is descended from a form like the *Bathypeltidae*, and not, as Kölliker believes, from a primitive simple 'Archypitulum.'

The paper is an abstract of an extended monograph which is to be published in the *Phil. trans.*; but the author is an American naturalist, and the researches were made upon the coast of North Carolina. — (*Proc. royal soc.*, no. 222.)

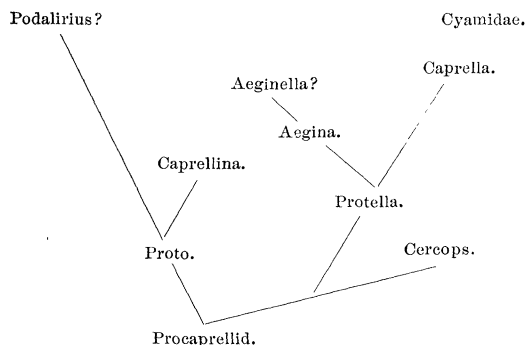
Living specimens of the very rare genus *Funiculina* have been obtained near Lisman Island, and they have been observed and studied by A. Milnes Marshall and William P. Marshall. The immature or young specimens have all the characteristics of *Funiculina Forbesii* (Verrill), while the full-grown ones are typical specimens of *F. quadrangularis* (Pallas); and the authors therefore reject Verrill's identification of the northern form as a new species. The paper contains a revision of the literature of the Pennatulida, and an account of the general anatomy of *Funiculina*, *Virgularia*, and *Pennatula*, but it adds very little to the researches of Kölliker and others. — (*Rep. Oban Pennatulidae*.) W. K. B. [1090]

Hydro-medusae without digestive organs. — Dr. Lendenfeld describes a new sub-family of hydroids, *Eucopellinae*, in which the medusa has no digestive organs, and lives only a short time after its escape from the genophore. Only one species, *Eucopella campanularia*, is known, and this is found in Australia. The larva is a campanularian whose hydranths are carried upon short, unbranched stems, which

spring from a creeping root. The medusa has a veil, well-developed marginal sense-organs, radial and circular chymiferous tubes, and large reproductive organs, but it has no mouth, stomach, or tentacles. It discharges its reproductive elements within twenty-four hours after its liberation, and it lives only about thirty-six hours. — (*Zool. anz.*, April 16.) W. K. B. [1091]

Crustaceans.

Monograph of the Caprellidae. — In the sixth of the series of beautiful zoological and botanical monographs published by Dr. Dohrn's station at Naples, Dr. Paul Mayer treats of the bizarre crustaceans belonging to the family Caprellidae. The systematic part of the work (pp. 16-90) is the most important, being not barely descriptions of the species found in the Bay of Naples and its neighborhood, but a revision of all the known species of the world. The systematic part is followed by an account of the anatomy, histology, and habits. The few pages (165-168) devoted to development do not add much to the little previously known through the studies of Gamroth. Mayer concludes that the families Cyamidae and Caprellidae are closely related, and form a natural group, Laemodipoda; that the Cyamidae are a later group than the Caprellidae, and are derived from a genus very near Caprella; that the Laemodipoda form a group of the Amphipoda, and are most closely related to the gammaroid Amphipoda. The author's conception of the relationship of the eight known genera of Caprellidae is expressed in the following genealogical tree.



As nothing is known of the paleontological history of these animals, and but little of the development, this phylogeny is founded almost exclusively upon the adult structure. The species found in the Bay of Naples, together with anatomical and histological details, are figured on ten lithographic and photolithographic plates. — (*Fauna u. flora golfes Neapel*, vi. 1882.) W. F. [1092]

Insects.

Color-preferences of insects. — Müller gives a general résumé of the results so far reached, with a brief account of the literature. — (*Biolog. centralbl.*, 1883, no. 4.) W. T. [1093]

Illustrations of American butterflies. — In the eleventh part of his *Butterflies of North America*, Mr. W. H. Edwards furnishes plates of more than usual interest, and of a fidelity to nature which we have come to expect from this source. They have, indeed, never been surpassed, and it would be difficult to point out an error of delineation. The plates of this particular number do not show such a wealth

of varietal illustration as some of the previous ones; but each of them presents new biological features. The first represents four species of *Pieris*, with larva and chrysalis of two of them (*Sisymbri* and *Beckeri*) from drawings made in southern California by Mead; the egg of the former is also given. The second plate is entirely given to *Limenitis Eros*, and illustrations are given of every stage of the larva (seven figures), of the egg and chrysalis, besides enlarged drawings of the details of structure in the larva. Considerable space is given to the natural history of the insect, largely from the observations of Wittfeld in Florida; its relations to *L. Disippus* are also discussed, as far as the preparatory stages are concerned.

The third plate has the highest interest, because we are for the first time introduced to the natural history of any of our native erylid butterflies. Through the efforts of Mr. Doll at Tucson, Arizona, Mr. Edwards has been able to trace and figure the entire history of one and the earliest stages of another species of *Lemonias*, feeding naturally on mesquite (*Prosopis juliflora*), but which he managed to raise in West Virginia on wild plum, after repeated failures on other plants. Of *L. Nais*, three figures are given of the egg, or parts of the egg, seven of the four stages of the larva, besides four plain figures of structural details, two of the chrysalis, and four of the butterfly; of *L. Palmeri*, the egg, young larva, and butterfly are figured. These figures show the larva to have a head scarcely smaller than the body behind it, partially covered by, but not, as in lycaenid butterflies, retractile within, the segment following; to be clothed, when just from the egg, with long sweeping hairs, and in after life by clusters of short spreading hairs arranged in longitudinal rows, continuous without deviation over thoracic and abdominal segments. Neither egg nor chrysalis shows any difference of importance from lycaenids. Another number will complete the second series (or volume) of this excellent iconography. [1094]

Fossil insects from Greenland. — Heer describes and figures a fragment of a large elytron from the cretaceous beds of Ivnaniguit, besides a small series of tertiary insects from Atanekerdruk and Haseninsel. Five of these are elytra of Coleoptera of various families, one a *Locusta* compared to *L. viridissima* of Europe, and one a fragmentary *Pteryganea*. Two other new fossil *Pteryganeae* are also figured from Parschlug and from Aix, and a *Helops* from the Molasse of Lausanne. The number of tertiary insects so far found in Greenland is recorded as thirteen. — (*Heer's Flora foss. groenl.*, ii. 143, pl. 109.) [1095]

VERTEBRATES.

Fish.

New southern marine fish. — Descriptions of twenty-five new fish from the southern United States have been published by Messrs. G. B. Goode and T. H. Bean. The new generic forms are of special interest. *Ioglossus* is a Gobiid allied to the Chinese *Oxymetopon* of Bleeker, although apparently not so 'closely' as supposed by the authors. It is much less compressed than *Oxymetopon*, has no keel on the head, and almost all the scales are cycloid. The individuals described were obtained at Pensacola, Fla. *Chriodorus* is a Hemirhamphine closely related to *Arrhamphus*, — so closely, indeed, that the differences between the two (if any) remain to be shown. The two have not been compared by the authors. The new type, *C. atherinoides*, was obtained at Key West, Fla. *Letharchus* is a new Ophichthid nearly related to *Sphagebranchus*, but differing externally by the

absence of an anal fin. Its species, *L. velifer*, was discovered in West Florida, and attains a length of about a foot and a half. Among the other noteworthy novelties, a new species of Porgy (*Stenotomus caprinus*) is also described from two specimens found in stomachs of the Red Snapper at Pensacola. — (*Proc. U. S. nat. mus.*, iv. 412.) T. G. [1096]

Characters of the centropomids. — The family Centropomidae has been diagnosed by Theo. Gill. Its most marked distinctive characters seem to be the elongation of the postorbital portion of the skull, 'a well differentiated posterior oblong, pentagonal, or hastiform area,' resulting from constriction of the parietals near their middle, and peculiarities of the vertebrae and their apophyses. — (*Proc. U. S. nat. mus.*, iv. 484.) [1097]

Mammals.

The bottle-nosed whale. — Capt. David Gray, through the agency of Prof. Flower, has recently made known, in a brief but interesting manner, the results of some observations on the whales of the genus *Hyperoodon*. It appears that the male bottle-nosed whale undergoes great changes in form with age, particularly as regards the head. The shape of this part of the body in females and young males is similar, the plane of the forehead making an acute angle with the plane of the mouth. As the male grows, however, the forehead becomes more and more prominent, and in old age its anterior surface stands at right angles with the plane of the mouth. Prof. Flower makes use of these observations to reduce the species hitherto recognized to a single one. — (*Proc. zool. soc. Lond.*, 1882, 726.) F. W. T. [1098]

Development of the intermaxillary bone. — In an article published with great luxury of type and illustration, Th. Kölliker gives the results of his investigations on the intermaxillary bone, and the development of harelip and cleft palate. The memoir is one of special interest to the dentist and surgeon. We may mention here the following conclusions: 1. Since the human embryo has a separate intermaxillary, we may consider the same to be a typical structure in facial clefts; 2. The intermaxillary is composed of two bones; 3. The united bone is destined to carry the four incisors, and many of the irregularities of the teeth in position and number are due to the fact that they are developed independently of the bones destined to carry them. For further details we must refer to the original, which only partially comes within the scope of this journal. — (*Nova. acta. acad. nat. cur.*, xliii. 325.) C. S. M. [1099]

ANTHROPOLOGY.

Bove on the Fuegians. — An interesting account of the Fuegians has appeared at Genoa under the auspices of the committee of the Italian antarctic expedition. It is prepared by Bove, and illustrated by a geographical chart of Tierra del Fuego and Patagonia, and an ethnological chart showing the distribution of the different races inhabiting the Land of Fire. The latter are divided into two very distinct stocks, separated by Admiralty Sound and Beagle Channel. The Ona reside on the east and north of these passages, on the largest of the Fuegian Islands, and comprise about two thousand souls. To the west and south are the Yamana (Jagan), a race comprising about three thousand, and the Alkaluf, about as many more. These people, perhaps of identical origin, now form two well-differentiated races, who are constantly at war. The Ona and Alkaluf have a rough and guttural language, while that of the Ya-

mana is soft, and rich in vowel-sounds. A very vivid description of the character of the Fuegian country and of its people is given by Bove, who describes their distribution, physical characteristics, habits, dress, and wanderings; their birch-bark canoes, with which they brave storms, and pursue the seals and even whales; the wretched position of the women, who are practical slaves, living in polygamy, and yet unusually fertile, though a majority of the children succumb to exposure and insufficient food; their marriage customs, and treatment of their families, which appear to be chiefly remarkable for a stony selfishness unmitigated by affection or pity on the part of the males; their Shamanism and blood-revenge, the latter strictly on Mosaic principles; their weapons, camps, and ornaments; the treatment of the dead, linguistics and the ameliorating influence of the faithful missionaries in that desolate land. The language appears, like that of many barbarous peoples, to be rich in words. Over thirty thousand vocables are enumerated in the Yamana tongue, besides agglutinations. They appear to have no reverence for the dead. One fellow sold his father's skull to Bove, and wished it a pleasant journey over the sea (cf. 1085). — W. H. D. [1100]

Aboriginal soapstone-quarries. — Not many years ago the occurrence of copper, mica, and soapstone vessels in the Indian graves of our eastern states pointed, it was supposed, to a vast aboriginal commerce, embracing the whole continent in its network of communications. The researches of practical archeologists, however, are constantly bringing to light new sources of supply, that were formerly worked much nearer to the mounds and graves where their productions found their last resting-place. The finding of many half-finished pots and rude tools at Chula, in Virginia, was soon followed by the discovery of several large soapstone-quarries in the District of Columbia. To the subject of this class of Indian work, Mr. J. D. McGuire of Ellicott City, Md., has given much attention. He has found soapstone-quarries in Maryland, and, after considerable research, has discovered the methods of this aboriginal handicraft. — (*Amer. nat.*, June.) J. W. P. [1101]

Words for color. — Lazarus Geiger, in one of his suggestive lectures, attempts to show that sense-perceptions have had a very recent evolution by tracing downward from the Homeric poems the terms employed to designate color. A very much more learned discussion of the same subject is that by Prof. Thomas R. Price, respecting the color-system of Virgil. In this essay it is not maintained that the words for color indicate the state of the color-sense, but the adaptation of language to the color-perceptions of the eye.

What idea had the ancients of color? Certainly they did not hold it to be a subjective sensation produced by three sets of nerves within the eye by three kinds of waves differing in length. Rather, in the Indo-Germanic languages, the color of a thing is the cover or skin that overlies or hides the true substance.

In nature, seen under ordinary daylight, there are for the healthy human eye about eleven hundred distinguishable colors. For a hundred and two of these, Roget has names; but the number of color-names in modern French is said to be not short of five hundred. Alma Tadema reproduces his color-impressions of the antique world by a palette of twelve colors, while the palette of Virgil's vocabulary contains twenty-seven terms of high colors, and fifteen more for shades due to excess or deficiency of illumination.

An ingenious set of comparisons leads the author up to the ratio of the occurrence of each set of color-terms to the entire eleven hundred. "His perceptions of color are clearest and strongest in the middle of the spectrum; even in his sensuous imagination, he is temperate and reserved, avoiding the extremes of sensation, and dwelling by preference upon the mean terms, the *media via* of visual perception."

Prof. Price draws attention to the striking coincidence of scientific accuracy with prophetic genius in the phrase of Virgil, *Mille coloribus arcum* (*Ecl.*, v. 609), and the discovery of Aubert (*Rood*, p. 40),

that in the solar spectrum the unaided eye may distinguish a thousand colors. The following terms are traced to their origin, and their fundamental idea fixed: ruber, rutilus, sanguineus, cruentus, sandix, minium, ferrugo, roseus, viridis, vitreus, hyalus, igneus, spadix, flavus, fulvus, croceus, luteus, aurum, cereus, pallidus, lividus, caeruleus, purpureus, puniceus, murex, ostrum, albus, candidus, niveus, argenteus, lacteus, marmoreus, decolor, canus, glaucus, ater, niger, fuscus, fumens, pullus, piceus. — (*Amer. journ. phil.*, v. 1.) o. t. m. [1102]

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Smithsonian institution.

Explorations in Louisiana. — Capt. R. W. Shufeldt, medical corps U. S. A., has, since October last, assisted by grants from the Smithsonian institution, been exploring the country in the vicinity of the city of New Orleans, La. The collection that this officer has made has just been forwarded to the institution at Washington. It consists of some three thousand specimens of very interesting forms of the representative vertebrates and invertebrates of that region, besides the contents of the Indian shell-mound situated in the rear of Carrollton, — an antiquity suspected to exist by Foster, from reports he had heard when engaged in his explorations in that locality. Among the vertebrates, some very uncommon forms of bats have been forwarded, and six or seven specimens of the rare *Bascanium anthicum*, and one of the *Aspidonectes asper*, the soft-shelled turtle, so eagerly sought after by collectors. Of the fish, Dr. T. H. Bean, curator of the department of fishes at the Smithsonian institution, says, "Two of the determinations are uncertain. The examples of *Lepomis* 32410 and 32419 are so small that I cannot be sure what they are, the lower pharyngeals being little developed, and with incomplete dentition; 32412, 32414, and 32420 agree with the published descriptions of *Zygonectes chrysoties* Günth., but they may represent a species quite distinct from that. I will try to get fuller information about Günther's types through some one of my friends who will visit the British museum next summer. The species called *Mollienesis latipinna* would be regarded as *M. lineolata* by our friends, Jordan and Gilbert; but I think your series will prove that *lineolata* is not distinct from *latipinna*; and, as *latipinna* is the older name, we should use it.

"The lot of *Elassoma zonatum* (32423 = No. 108) is the largest and finest ever known in this museum, and there is no probability that any collector has secured a better series. The range of variation is greatly extended by them, and a new locality is found. O. P. Hay had the species from Mississippi; it is known, also, from Alabama, Texas, and South Illinois."

Dr. Shufeldt will work this material up for publication by the Smithsonian institution as soon as the opportunity offers.

STATE INSTITUTIONS.

State university of Kansas, Lawrence.

Weather report for May. — This month had the largest rainfall, the greatest aggregate wind-velocity, and, with one exception (1882), the lowest mean temperature, recorded in any May of our sixteen years' obser-

vations. The light white frost of the 22d did no damage to vegetation, and the growing crops are in prime condition at the close of the month.

Mean temperature, 62.05°, which is 4.08° below the average May temperature. The highest temperature was 91°, on the 2d; the lowest was 39°, on the 22d; monthly range, 52°: mean temperature at 7 A.M., 56.19°; at 2 P.M., 71.13°; at 9 P.M., 60.45°.

Rainfall, 7.63 inches, which is 3.56 inches above the May average. There were five thunder-showers. Hail accompanied the rain of the 13th without damage at this station. On the 13th the rainfall was three and one-half inches, which daily register has been but twice exceeded in the past sixteen years. Of this amount, two inches fell in one hour and three-quarters, from 3.45 to 5.30 P.M. The entire rainfall for the five months of 1883 now completed has been 14.07 inches, which is 2.25 inches above the average for the same period in the past fifteen years.

Mean cloudiness, 47.63% of the sky, the month being 1.75% clearer than usual. Number of clear days (less than one-third cloudy), 11; entirely clear, 3; half-clear (from one to two thirds cloudy), 14; cloudy (more than two-thirds), 6; entirely cloudy, 3; mean cloudiness at 7 A.M., 46.77%; at 2 P.M., 56.45%; at 9 P.M., 39.68%.

Wind: N.W., 25 times; S.E., 20 times; S.W., 16 times; S., 14 times; N.E., 13 times; W., 3 times; N., twice. The entire distance travelled by the wind was 15,661 miles, which is 3,334 miles above the May average. This gives a mean daily velocity of 505 miles, and a mean hourly velocity of 21.04 miles. The highest velocity was 60 miles an hour, on the 13th.

Mean height of barometer, 29.010 inches; at 7 A.M., 29.017 inches; at 2 P.M., 28.989 inches; at 9 P.M., 29.029 inches; maximum 29.355 inches, on the 5th; minimum, 28.496 inches, on the 13th; range, 0.859 inch.

Relative humidity: mean for month, 64.5; at 7 A.M., 75.3; at 2 P.M., 45.9; at 9 P.M., 72.3; greatest, 100, on 13th; least, 14, on the 9th.

NOTES AND NEWS.

The American association for the advancement of science will hold its thirty-second annual meeting at Minneapolis, Minn., Aug. 15 and following days. The president-elect is Prof. C. A. Young of Princeton, and the following is the list of the general officers of the meeting: section A (Mathematics and astronomy), vice-president, W. A. Rogers of Cambridge; secretary, W. W. Johnson of Annapo-

lis. **B** (Physics), vice-president, H. A. Rowland of Baltimore; secretary, C. K. Wead of Ann Arbor. **C** (Chemistry), vice-president, E. W. Morley of Cleveland; secretary, J. W. Langley of Ann Arbor. **D** (Mechanical science), vice-president, DeVolsen Wood of Hoboken; secretary, [to be chosen at meeting]. **E** (Geology and geography), vice-president, C. H. Hitchcock of Hanover; secretary, A. A. Julien of New York. **F** (Biology), vice-president, W. J. Beal of Lansing; secretary, S. A. Forbes of Normal. **G** (Histology and microscopy), vice-president, J. D. Cox of Cincinnati; secretary, C. Seiler of Philadelphia. **H** (Anthropology), vice-president, O. T. Mason of Washington; secretary, G. H. Perkins of Burlington. **I** (Economic science and statistics), vice-president, F. B. Hough of Lowville; secretary, J. Cummings of Evanston. The permanent secretary is F. W. Putnam of Cambridge; the general secretary (of the meeting), J. R. Eastman of Washington; assistant general secretary, Alfred Springer of Cincinnati; and the treasurer, William Lilly of Mauch Chunk.

The headquarters of the association will be at the State university; the hotel headquarters of the permanent secretary, the Nicollet House. Members expecting to attend the meeting are requested to notify the local secretary, Prof. N. H. Winchell, Minneapolis, as early as possible. Badges of membership will be distributed to all who register.

The following are the principal officers of the local committee. Chairman and treasurer, Hon. George A. Pillsbury; secretary, Prof. N. H. Winchell; and chairmen of the several sub-committees, as follows: invitations and reception, President W. W. Folwell; finance, J. C. Seeley, Esq.; transportation and excursions, Thomas Lowry, Esq.; entertainment, hotels, lodgings, and luncheons, Hon. A. C. Rand; rooms and places of meetings, Hon. Eugene M. Wilson; printing, David Blakely, Esq.

—The annual meeting of the Society for the promotion of agricultural science will be held in Minneapolis, Aug. 13 and 14, just previous to the meeting of the American association.

—It is announced that Lieut. Schwatka, accompanied by Assistant Surgeon Wilson, C. A. Homan, U. S. engineer corps, and three private soldiers, left for Chilkat, Alaska, May 22, from Portland, Or., on the steamer Victoria. They are provisioned for a six-months' cruise, will employ Indians for packers, etc., and intend to ascend the Chilkat River to its head, make the passage to the head waters of the Lewis River, and descend the same to its junction with the Yukon, and descend the Yukon River to its mouth. It is said to be their intention to survey the course of these rivers; and there is no doubt that a properly qualified and equipped party would find abundance of useful work ready to their hands. The whole route has been travelled before, but not

by persons in search of, and qualified to obtain, geographical information, except in very small part. The explorations of the Krause brothers on the Chilkat and vicinity have been alluded to before. The Yukon has been superficially examined by McMurray, Ketchum, Zagoskin, Dall, Whympier, Raymond, Nelson, and others, and a few points have been astronomically determined; but nothing like an exact map has been attempted, nor do the data for it exist. Astronomical and magnetic observations anywhere along its banks, and especially any data for a map of the Lewis River and its feeders (which are only known from the reports of prospectors and natives), would be of the highest interest.

—The treasurer of the American committee of the Balfour memorial acknowledges the following additional subscriptions: Prof. L. A. Wait, Cornell university, \$5; Dr. M. J. Roberts, post-graduate medical school, New York, \$5; Prof. E. A. Birge, University of Wisconsin, \$10; Adam Bruce, Princeton college, \$4; W. M. Rankin, Princeton college, \$2; W. B. Scott, Princeton college, \$10; Lyceum natural history, Williams college, \$5; classes '83 and '85, Williams college, \$10; S. F. Clarke, Williams college, \$10; Warren E. Dennis, Newark, N.J., \$4; Abraham Jacobi, New York, \$10; T. M. Prudden, New York, \$5; L. Waldstein, New York, \$10; William H. Welch, New York, \$10; Miss G. A. Lewis, Philadelphia, \$1; Joseph Leidy, Philadelphia, \$4; C. S. Minot, Harvard medical school, \$5; E. Burgess, Boston society natural history, \$5; J. B. Steere, University of Michigan, \$4; A. Winchell, University of Michigan, \$7; Students' literary department, University of Michigan, \$5.70. Previously acknowledged, \$518.25.

—Mr. A. H. Keane; whose recent appointment as lecturer in Hindustani, at University college, London, has been raised by the council to full professorship, 'in consideration of Mr. Keane's great eminence as a scholar,' has just issued a prospectus for a work entitled 'A classification of the races of mankind,' which will form two large octavo volumes of about six hundred pages each. He aims in it to provide the student of ethnology with a comprehensive treatise on the races of mankind, which shall correspond with the present state of anthropologic knowledge, and supersede all previous attempts of this sort, however well done. To use his own words, "In the general introduction such broad questions will be dealt with as the evolution of man, the antiquity and specific unity of the species, the present varieties of mankind, the physical and moral criteria of race, the fundamental human types, their evolution and dispersion, the peopling of the continents, the origin of articulate speech, the morphological orders and families of speech, the problem of specific linguistic diversity within the same ethnical group."

He will then deal with the great physical divisions of the human family, discussing each of its

main sections under three separate heads, — first, the physical and moral characteristics of the type; second, the main branches of each (under this head the classification will be carried out); third, an alphabetical index which will form a complete ethnologic gazetteer, collecting all known races, tribes, and languages under short descriptive titles, alphabetically arranged, and full of references to authorities. The Asiatic domain alone furnishes, according to Mr. Keane, some four thousand entries.

The work will be published only upon the condition of there being five hundred subscribers.

—The annual meeting of the American academy of arts and sciences was held in Boston, Tuesday, May 29. The following officers were elected for the ensuing year: president, Professor Joseph Lovering; vice-president, Dr. Oliver Wendell Holmes; corresponding secretary, Professor Josiah P. Cooke; recording secretary, Professor John Trowbridge; treasurer, H. P. Kidder; librarian, S. H. Scudder. Four new members were elected: Prof. J. W. Mallet of the University of Virginia, and Dr. Atticus G. Haygood of Oxford, Georgia, as associate fellows; George B. Dixwell of Boston as resident fellow; and Adolph Wurtz of Paris as foreign honorary member.

The list of members of the academy now includes one hundred and ninety-two resident fellows, ninety-two associate fellows, and seventy-two foreign honorary members. The loss by death this year has been as follows. Resident fellows: Augustus A. Hayes, Brookline; William B. Rogers, Chandler Robbins, and Nathaniel Thayer, Boston. Associate fellows: Charles Avery, Clinton, N.Y.; Henry Draper, New York; Isaac Ray, Philadelphia; George P. Marsh, Rome. Foreign honorary members: Joseph Liouville, Paris; Émile Plantamour, Geneva; Friedrich Kohler, Göttingen; T. L. W. Bischoff, Munich.

The academy voted unanimously to confer the Rumford gold medal upon Professor Henry A. Rowland of Baltimore for his researches in light and heat.

The following papers were presented by Mr. W. T. Brigham: 1. Recent volcanic phenomena on the Hawaiian Islands; 2. The flow of lava-streams as illustrated by the Hawaiian eruption of 1881. Professor Cooke presented the following contributions from the chemical laboratory of Harvard university by title: 1. On tumerol, by C. Loring Jackson and A. E. Menke; 2. On curcumin, by the same authors; 3. On the action of phosphorous trichloride of aniline, by the same authors; 4. On the action of sodic ethylate on benzaldehyde, by C. Loring Jackson and G. T. Hartshorn; 5. On the action of concentrated hydrobromic acid upon mucobromic acid and other related substances, by H. B. Hill; 6. On the action of alkaline hydrates upon mucobromic acid, by H. B. Hill and E. K. Sterns; 7. On phenoxychloracrylic acid, by M. Loeb; 8. On β -phenyltri-

brompropionic acid, by L. P. Kinnicutt and G. M. Palmer; 9. On the determination of nitrites with potassic permanganate, by L. P. Kinnicutt and J. U. Nef; 10. On the determination of sulphites with potassic permanganate, by L. P. Kinnicutt and R. Penrose; 11. On the vapor density of the chloride, bromide, and iodide of antimony, by C. P. Worcester; 12. On a method of correcting the weight of bodies of unknown volume for the buoyancy of the atmosphere, and its applications, by J. P. Cooke. Professor Asa Gray presented the following from the Botanic garden. Contributions to American botany: 1. List of plants from south-western Texas and northern Mexico, collected chiefly by Dr. E. Palmer in 1879–80 (II. Gamopetalae to Acotyledones) by Sereno Watson; 2. Descriptions of new species of plants, with revision of certain genera, by Sereno Watson. Professor Trowbridge presented the following papers from the physical laboratory of Harvard university: 1. Attraction of a shell bounded by confocal ellipsoidal surface, by F. N. Cole; 2. Weber's theory of magnetism, John Trowbridge and C. B. Penrose; 3. Electromotive force, John Trowbridge and E. K. Stevens; 4. Effect of magnetism on the conduction of heat, John Trowbridge and C. B. Penrose. A paper on the deduction of different star catalogues to a common system was presented by title by Prof. W. A. Rogers.

—At the semi-annual meeting of the American oriental society, held in the hall of the American academy, Boston, May 2, papers were read as follows: by T. O. Paine, on the Julian inscription of Gerash; by L. Dickerman, on the Site of the Pithom of Exodus i. 11; by B. S. Lyman, on the Japanese Nigori of composition; by J. W. Jenks, Some remarks on oriental genius; by W. D. Whitney, on the Jāiminiya Brāhmana; by J. Avery, on the Modes in relative clauses in the Rig-Veda; by M. Bloomfield, on Certain Vedic subjunctive forms; by D. G. Lyon, Discussion of the question whether or not there was a god El at the head of the Babylonian pantheon; by I. H. Hall, on the Bronze crab inscription on the New-York obelisk; by B. S. Lyman, on Certain Pekingese sounds; and by W. W. Rockhill, Translation of two Buddhist Sūtras. The society adjourned to meet in New Haven in October.

—M. Raoul Pictet has recently completed a small steam-vessel designed to illustrate the advantages possessed by a form of hull proposed by him to be adopted for very high speeds, and has made preliminary trials on the waters of Lake Geneva. His boat has a full, nearly square, midship section, with a flat floor and sharply turned bilges, vertical topsides, a sheer plan having a line of keel very nearly parabolic, the vertex of the curve at the bow, and the maximum ordinate at the rudder-post. The leading idea is to so form the vessel that the water shall be displaced vertically downward as far as possible, in order that the

upward reaction shall raise the craft, and thus diminish head-resistance at very high speeds.

Comparing the curve of resistance with that of boats of the usual form, it is found that it does not differ, in any great degree, at ordinary low speeds; but at sixteen kilometres and upward (about ten miles) the resistance is less, and at twenty-seven kilometres (sixteen and three-fourths miles) the resistance is but about one-half that of the common form of vessel. The Pictet boat was tested beside the fast yacht of Madame Rothschild, the *Gitana*, and was found to be slightly inferior at low speeds, but decidedly superior at the higher speeds.

The new vessel is of a little more than twenty-five tons' displacement. It would seem that the proposed form would be of less importance for large vessels, in which the resistance is in larger proportion frictional, and less in head-resistance, and that the advantages of the Pictet form are to be realized principally in small yachts and in torpedo vessels. The boat and its performance are described in *La Nature*, and reproduced in the *Sc. Amer. supplement*, May 19, 1883.

—At the meeting of the Biological society of Washington, May 25, the following papers were read: Dr. Thomas Taylor, on Actinomykosis, a new infectious disease of man and the lower animals, with exhibition of a portion of the diseased viscera of a dog, containing specimens of the fungus *Actinomyces*; Dr. D. E. Salmon, remarks on Actinomykosis; Prof. C. V. Riley, remarks on curious *Psyllidae* and certain gall-making species.

—Mr. Lester F. Ward has made a preliminary study of an interesting collection of fossil plants brought to the U. S. geological survey in 1882, by Dr. C. A. White, from the Laramie beds of the lower Yellowstone River. No less than thirty-four species are identified with those already described and figured, including many of those from Fort Union, described by Dr. Newberry, and a number from other localities in the west. A few, however, belong to species that have not heretofore been found within the territory of the United States (arctic or European). In addition to these, there was found a large number of forms which could not be identified, some of which are of peculiar interest. As Mr. Ward expects to visit these beds during the present season, and hopes to obtain more and better material, no descriptions of new species will be published until further study of these forms can be made.

—Ten years ago the magnificent private collections of Dr. Gustav Klemm, whom all anthropologists love to honor, were sold by his heirs to the city of Leipzig for the Museum für Völkerkunde. If we mistake not, Dr. Klemm was the first to announce distinctly the oneness of all human art and industry as a unique subject of study, dividing human occupations, implements, processes, and productions into genera and species, and aiming to find in each class

the cause of its origin, as well as the law of its evolution. Each year since the transfer, a report of the progress of the museum has been published, the tenth number of which has just come to hand. The affairs of the institution are managed by a board of trustees, who rely upon subscriptions mainly to pay the current expenses.

—The explorers whom the French geographic society has recently adjudged worthy of its gold medals are: Commandant Gallieni, for his expedition to the upper Niger and Segu two years ago; Commandant Derrien, leader of a topographic party in Senegal at the same date; M. Charles Huber, for travels in Arabia during the past three years; Lieut. F. Schwatka, for his arctic voyage to King William's Land; and M. Langlois, for maps of the department of Oran, Algeria.

—At the meeting of the Engineers' club of Philadelphia, May 5, Mr. T. M. Cleemann was enabled to show, through the courtesy of Mr. W. W. Evans of New York, a map and profile of the Southern Pacific railroad in California, where it crosses the dried-up bed of a lake, being below the surface of the Pacific Ocean for 58 miles, and attaining a depth below said surface of 266 feet. At this point it skirts a deposit of salt from six to twenty-four inches in thickness. He also showed a number of photographs of the Tehachapi Pass, on the same railroad, near San Fernando. In order to attain the summit with a sufficiently reduced grade, the line was 'developed,' advantage being taken of a conical hill to wind about it in the form of a helix, crossing itself, and continuing on its way with several meanderings. The St. Gothard railroad has several such helices, but they are cut in the solid rock. A similar location was made, about eighteen years ago, on the Southern Pennsylvania railroad, but it was not built. Another piece of interesting location was also exhibited; namely, the mountain division of the Western North Carolina railroad, which shows great skill in fitting a line to the country. Mr. George S. Strong described a new method of manufacture of corrugated boiler-tubes. Mr. E. F. Loiseau gave a sketch of the progress and condition of the manufacture of artificial fuels. Mr. R. H. Sanders described a derrick used for hoisting material from a slate quarry by means of cable and bucket; and Mr. T. M. Cleemann noted a similar method pursued in the construction of a viaduct in Peru, 252 feet high, when the pieces were conveyed by a traveller to the pier. Mr. C. G. Darach continued his remarks with regard to the relative quality of water at the top and bottom of deep reservoirs, and discussed methods of meeting the difficulty encountered in the accumulation of impurities below the surface.

—C. F. Holder contributes to the June number of Lippincott's magazine an excellent article on Animals extinct within human memory. The greater portion

of the paper relates to birds, — the great auk, the dodo, and the giant birds of New Zealand; but the mammoth and Steller's manatee are specially mentioned among mammals.

— The Royal geographical society has lately awarded medals to Sir J. D. Hooker for his services in scientific and botanical geography, extending over many years, and based on voyages to the Antarctic and Australian seas, to India and the Himalaya, and travels in Morocco and the United States; and to E. C. Baber, of the British legation at Peking, for his reports and maps of journeys into the interior of China. Money-grants were voted to Abbé Petitot for his researches to the north of Great Slave Lake, to W. D. Cowan for his surveys in central Madagascar, and to F. C. Selous for his journeys in the Zambesi basin.

— At a meeting of the Society of arts, Massachusetts institute of technology, May 24, Professor Elihu Thomson exhibited in operation, and explained, the Thomson-Houston system of electric lighting of the American electric company of New Britain, Conn.

— When noticing, in a former number of SCIENCE, the curious worm-like articulated impressions from the Potsdam sandstone, the writer of the notice was not aware that the name 'Ruschnites' had been previously proposed by Mr. Whiteaves for the similar markings from the Gaspé sandstone referred to in the note.

— In the weekly summary, ¶ 614, for 'tortricid moth,' read 'tineid moth.'

RECENT BOOKS AND PAMPHLETS.

Adamson, Ch. M. Another book of scraps, principally relating to natural history. Newcastle-on-Tyne, 1883. illustr. 4°.

Aschieri, F. Geometria proiettiva e descrittiva. Milan, 1882. 354 p. 12°.

Beddome, R. H. Handbook to the ferns of British India, Ceylon, and the Malay Peninsula. London, *Thacker*, 1883. 500 p., 300 illustr. 8°.

Bove, G. Patagonia, Terre del Fuoco, Mari Australi. Rapporto della spedizione da lui capitanata al Comitato centrale per le esplorazioni antartiche. Part I. Genoa, *R. Istituto*, 1883. 150 p. 8°.

Brown, J. C. The forests of England, and the management of them in by-gone times. Edinburgh, 1883. 268 p. 8°.

Busley, C. Die schiffsmaschine, ihre construction, wirkungsweise u. bedienung. Abtheil. I. Kiel, 1883. 240 p. 8°.

Chalon, J. Les premiers âges de la terre et de l'homme fossile. Bruxelles, 1883. 105 p., illustr. 12°.

Clerk, Ch. Études de géologie militaire. Les Alpes françaises. Paris, 1883. illustr. 8°.

Comisión del mapa geológico. — Breve idea de la constitución geológica de España, presentada en la exposición de minería, celebrada en Madrid en 1883. Madrid, *Tello*, 1883. 20 p. 8°.

Cré, L. Essai sur la flore primordiale. Paris, 1883. 80 p., illustr. 8°.

Devic, L. M. Le pays des Zendjs, ou la côte orientale d'Afrique au moyen âge (géographie, mœurs, productions, animaux légendaires), d'après les écrivains arabes. Paris, *Hachette*, 1883. 280 p. 8°.

Eckardt, T. Physics in pictures: the principal natural phenomena and appliances described and illustrated. Translated by A. H. Keane. London, 1883. illustr. f°.

Fick, A. Philosophischer versuch über die wahrscheinlichkeiten. Würzburg, 1883. 8°.

Fischer, E. L. Ueber das princip der organisation u. die pflanzenseele. Mainz, 1883. 153 p. 8°.

Garrod, A. E. The nebulae: a fragment of astronomical history. London, *Parker*, 1883. 44 p. 8°.

Gaudry, A. Les enchainements du monde animal dans les temps géologiques fossiles primaires. Paris, *Savy*, 1883. 323 p., 285 illustr. 8°.

Gisevius, P. Beiträge z. methode d. bestimmung d. spec. gewichts v. mineralien u. d. mechan. trennung von mineralgemengen. Bonn, 1883. 81 p. 8°.

Goodwin (bishop of Carlisle). Walks in the regions of science and faith. London, *Murray*, 1883. 304 p. 8°.

Guillemin, A. Le monde physique. Paris, *Hachette*, 1883. 3 vols. 32+874; 4+670; 1011 p., illustr. 8°.

Haussknecht, O. Lehrbuch der chemie u. chemischen technologie. Hamburg, 1883. 484 p., illustr. 8°.

Hirsch. Rapport sur les machines et les appareils de la mécanique générale à l'Exposition universelle internationale de 1878 à Paris. Paris, 1883. 609 p. 8°.

Hollefreund, K. Die gesetzte der lichtbewegung in doppelt brechenden medien nach der Lommel'schen reibungstheorie. Halle, 1883. 4°.

Houba, M. J. H. Over de strooming van vloeistoffen door buizen. Nijmegen, 1883. 104 p. 8°.

Hoyer, A. G. E. Planten-album. Ter bevordering van de kennis der algemeen in Nederland groeiende planten. Tiel, 1883. 95 p. 4°.

Kolbe, H. Kurzes lehrbuch der organischen chemie. Braunschweig, 1883. 509-864 p. illustr. 8°.

Lanier, L. Choix de lectures de géographie, accompagnées de résumés, d'analyses et de notes explicatives. Paris, *Belin*, 1883. 84+656 p. 12°.

Le Paige, M. C. Essai de géométrie supérieure du 3e ordre. Bruxelles, 1883. 132 p. 8°.

Lindner, M. Die elektricität im dienste v. gewerbe u. industrie. Leipzig, 1883. 4°.

Maurer, M. Statique graphique. Paris, 1883. illustr. 8°.

Melde, F. Akustik. Fundamentalserscheinungen u. gesetzte einfach tönender körper. Leipzig, 1883. 364 p. illustr. 8°.

Naville, E. La physique moderne. Paris, 1883. 8°.

Nysom, H. Hydrografisk kart over det sydlige Norge udarbejdet ved kanalkontoret. Christiania, 1882. 8°.

Ormerod, E. A. Report of observations of injurious insects during the year 1882; with methods of prevention and remedy, and special report on wireworm. London, *Simpkin*, 1883. 98 p. 8°.

Pattison, S. R., and Friedrich, Dr. The age and origin of man geologically considered. London, *Religious tract society*, 1883. 53 p. 12°.

Paulucci, M. Note malacologiche sulla fauna terrestre e fluviale dell'Isola di Sardegna. Siena, 1882. 247 p. 8°.

Pellet, H., and Seugier, G. La fabrication du sucre. T. I.: Historique; les principes sucres; saccharimétrie chimique et physique; analyse des sols; les terres à betteraves. Paris, *Pellet*, 1883. 390 p., illustr. 8°.

Rieth. Volumetrische analyse. Hamburg, 1883. 8°.

Saarbrucker steinkohlen-district. Flötzkarte. Mit profilkarte. Aubeldruck, *Saarbrücken*, 1883. f°.

Salterain, Pedro. Breve reseña de la minería de la isla de Cuba. Habana, *La Publicidad*, 1883. 24 p. 8°.

Schaedler, C. Die technologie der fette u. oele des thier- und pflanzenreichs. Berlin, 1883. illustr. 8°.

Schwartz, Th. Telephon, mikrophon u. radiophon. Wien, 1883. illustr. 240 p. 8°.

Sicard, G. Histoire naturelle des champignons comestibles et vénéneux. Préface par A. Chatin. Paris, 1883. illustr. 8°.

Songaylo, E. Traité de géométrie descriptive. Paris, 1882. 64+440 p., illustr. 4°.

Tissandier, G. Le problème de la direction des aérostats. Paris, 1883. 8°.

Travaux publics de la France. Publié sous les auspices du ministère des travaux publics, et sous la dir. de L. Reynaud. Paris, 1883. illustr. f°.

Tribolet, M. de. La géologie, son objet, son développement, sa méthode, ses applications. Conférence académique. Neuchâtel, 1883. 49 p. 8°.

Ullrich, V. Die horizontale gestalt u. beschaffenheit Europas u. Nordamerikas. Beitrag zur morphologie beider erdenräume. Leipzig, 1883. 8°.

Urban, J. Monographie der familie der Turneraceen. Berlin, 1883. 152 p., illustr. 8°.

Witz, A. Histoire des moteurs à gaz. Paris, 1883. 8.